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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

1924

Structural Changes of Enamel—*Rickert*

Physiologic Changes of Enamel—*Beust*

Permeability of Enamel—*Skillen*

Bridgework—*McDonagh*

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How to Build Sound Teeth

How to Use and Keep Children's Teeth

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EDITORIAL

The Dallas Meeting

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WILLIAM A. GIFFEN, D.D.S., F.A.C.D., Detroit, Michigan
President, American Dental Association
Sixty-sixth Annual Session, Dallas, Texas, November 10 to 14, 1924

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Original Communications

EVIDENCES OF STRUCTURAL CHANGES OF ENAMEL*

By U. GARFIELD RICKERT, M.A., D.D.S., Ann Arbor, Michigan

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

IT has been the general opinion for some time that, following the loss of Nasmyth's membrane, dental enamel reaches the end of its development and becomes an inert and lifeless structure. Results of more recent investigations give evidence indicating the possibility of structural changes, seriously challenging the former point of view. The subject is so intimately associated with the present-day studies of dental caries that it is worthy of the most painstaking consideration. I am not concerned at this time with the technical distinction between vital enamel and enamel changes that might be the result of simple physico-chemical processes quite unlike the metabolic changes taking place in nearly all other tissues. It is rather my purpose in this paper to present several angles from which the subject has been approached and personally investigated, indicating that the enamel may be more or less of a changing structure; to offer an explanation of how such changes may take place, and to compare our results with the results of other workers obtained by different technic.

From a review of the literature, one is impressed with the two types of papers dealing with the subject, the one group engaging principally with dogmatic and speculative statements drawn largely from the imagination, yet so logically written that they are at times dangerously misleading to the casual

*Working under grant from the Research Commission of the American Dental Association, University of Michigan College of Dental Surgery.

reader, and the other group being content with the presentation of research data, studiously avoiding definite conclusions. Before this section the former type of paper would have no place, for, as a prominent scientist has well said, "Medicine owes no debt of gratitude to those who teach her theories without proof." Several years ago, from a study of a large number of clinical cases, we began to suspect enamel changes. Visible evidences of such changes occur during pregnancy, certain periods of childhood, and also in a number of general pathologic conditions. Miller[1] observed variations of enamel when treated with weak acids. We have all seen the well-formed amber-colored teeth suddenly become chalky in appearance, first in definite areas, and finally involving all or nearly all of the tooth. These changes are not superficial in character, but if the cause continues long enough, they will affect the entire thickness of the enamel structure.

The visible physical differences are probably due to changes of refraction. The refractory changes may be caused by the withdrawal or addition of some part of the enamel structure. With the exception of Tomes[2] and Walkhoff, histologists generally recognize both prismatic and interprismatic substance. From the solubility tests to be described later, it is evident that one portion is much more soluble than the other, and we are inclined to suspect the interprismatic substance to be the more soluble. The withdrawal of the latter substance, producing the change of refraction, explains the chalky appearance. Our own studies of enamel permeability, coupled with similar results by Caush[3], Pickerill[4], Williams and others, although arrived at by entirely different methods, add strength to this view.

I shall undertake a demonstration of possible structural changes under three heads; permeability, solubility and specific gravity.

1. *Permeability of enamel.*—Our technic and results demonstrating permeability of enamel have already been published[5], and will not be considered here further than to call attention to the fact that varying degrees of permeability were observed, and that the enamels of unerupted teeth, if set up as permeable membranes immediately after removal, were much more permeable than those having functioned for some time. Pickerill also demonstrated the greater permeability of young teeth by means of stains and microscopic examinations. Briefly stated, then, at the one extreme, we have the freshly extracted, unerupted teeth with the most permeable enamels; at the other extreme, the highly and naturally polished enamels from teeth of persons of middle age, with fast approaching semipermeability. Enamels of the latter type may often be found where permeability is practically negligible. There are varying degrees of permeability between these extremes. There is good reason to suspect that individual enamels change during pregnancy and during certain stress periods. For obvious reasons, variations of osmotic pressures and penetration of stains are impossible of demonstration in the living tooth. Some observers admit progressive changes of the general structure but ridicule the idea of negative changes—in other words, as a whole, gaining in quality, never losing. Clinical observation, coupled with the demonstrable permeability and the solu-

1. Miller, W. D.: *Dent. Cosmos*, 47:30.
2. Tomes: *Dental Anatomy*, Ed. 7.
3. Caush: *Brit. Dent. J.* February, 1921.
4. Pickerill: Prevention of Dental Caries and Oral Sepsis, *Items of Interest*, March, 1919.
5. Bunting, R. W., and Rickert, U. G.: The Tooth, A Permeable Membrane, *J. N. D. A.* 5:519 (May) 1918.

bility experiments to be discussed later, make negative changes appear highly probable.

It has been repeated many times in our laboratories, and corroborated by Bodecker[6] and others, that enamels, if properly set with solvents on one side and solutes on the other, behave as permeable membranes. It also appears that Eckerman, a Scandinavian, did some theorizing about the time we were doing our work and did mention in a disconnected sense the term osmosis. This voluminous writer is at the present time much exercised regarding priority in usage of the term as applied to this subject. We are interested only in the presentation of experimental findings and not in the matter of priority or the analysis of ethereal contributions, for, as stated above, there is greater need for the attempts at proof than for the theories of the dreamer. The rotundity of the earth had often been suggested, but it remained for Magellan, encouraged by the successes of Columbus and other explorers, really to prove the earth to be a spherical body.

2. *Solubility of enamel.*—We tested relative solubilities in two solvents: distilled water, and in comparatively high and low percentage sugar solutions. While this is approaching the subject in an indirect way, it does introduce fundamentals essential to the process of enamel changes.

The technic in our solubility tests is as follows: Various types of enamel were separated from the dentin and then the dentinal surface was cut back with steel burs. This seemed essential in view of the work of Williams, Marshall, Caush and others who have demonstrated the penetration of these approximate tissues one into the other. Briefly stated, we tried to use only pure enamel. The sections were desiccated to constant weight and carefully weighed, after which some were placed in tubes of distilled water and duplicates were placed in sugar solutions. The tubes were then placed on a slowly moving circular table intended to prevent stagnation of the solutions, but the table was not allowed to move fast enough to permit serious loss by friction. The sugar solutions contained sufficient thymol to prevent fermentation. The tubes were kept in this slow motion for thirty-day periods. The sections were then carefully washed and dried to constant weight and the weights recorded. Nearly all specimens lost weight, those in the sugar solution exhibiting the greater loss. The enamels of the group that did not lose weight had been subjected to severe caries-producing forces before extraction and were undermined by extensive cavities. Qualitative tests for calcium and phosphorus were made of the solvents both before and after the experiments. Both the calcium and phosphorous tests were positive, demonstrating that a small amount of calcium phosphate had gone into solution. Some of the sugars could not be used without first making them calcium-free by precipitation with ammonium oxalate. The sections were then placed in fresh solutions and the tubes again kept in motion for thirty days. After drying to constant weight and weighing the second time, it was found that about the same loss of weight resulted in the second test.

For the second part of the experiment we made up a synthetic saliva consisting of about double the inorganic content of normal saliva. To this we added very small amounts of certain gums to approximate mucin. The specimens previ-

6. Bodecker: Permeability of the Enamel in Relation to Stains, *J. A. D. A.* 10:60 (Jan.) 1923.

ously used were then introduced into these solutions and placed in motion for thirty days, after which they were washed and dried to constant weight and weighed. None of these lost weight, while some remained the same, and several made very slight gains. It should be noticed here that the fact that small gains occurred is possibly due to greater permeability in these cases. The sections were then placed in normal salivas treated with thymol and placed in motion for thirty days and again washed, dried and weighed. All specimens remained nearly constant. At this time the sections were placed in distilled water and again all lost weight. This experiment is not yet complete but has been carried to the point where the more soluble portion has been removed, the later losses being considerably less than the earlier. The solvent action for the first sixty days was so pronounced that it occurred to us that if the enamel of a tooth were kept in a slowly changing stream of distilled water, it would all disappear in a few years. To get some data regarding this point we pulverized several enamels of different qualities to increase surface contact of solvent, placed them in distilled water and examined them on alternating days. These tubes were also kept slowly moving. It was found difficult to filter and weigh the residue, so we centrifuged and decanted the solution. The solution was tested for calcium, and repeated trials proved that the residue became less and less soluble. While solubility diminishes in distilled water, the residue is still very soluble if traces of organic acids are added. In 1915[7], we called attention to the diminished lime content of salivas of the highly susceptible, and the higher content of the relatively immune. This work has been corroborated by others. In view of the slight solubility of calcium phosphate in water, and in view of the fact that the lime content of susceptible patients is below saturation, it is highly probable that the more soluble part of enamel may go into solution even in nearly neutral solutions of unsaturated salivas, accounting for the visible changes mentioned above. Such weakened enamels would certainly break down much more rapidly if favorable conditions for caries formation prevailed, such as the unhygienic environment of the tooth.

Another point of interest to us was the difference in solubility of the poorly and well-formed enamels. Contrary to what we had anticipated, the well-formed enamels, as could have been concluded from previous statements, exhibited much greater losses than those poorly formed; on the other hand, the poorly formed enamels were the only ones to make gains. Enamels that had been completely undermined as the result of extensive caries yielded but very slight losses as compared to the better types, but made greater gains. From the latter type the more soluble portion has been removed. This data, in conjunction with clinical data, gives strong support to those who hold that general susceptibility is initiated by constitutional conditions resulting in a weakening of the enamel structure, making it easier for local forces to produce their destructive effects.

We have thus far presented two kinds of evidence: visible, clinical, actually taking place in the mouth; and experimental, illustrating the possible physical and chemical means by which such changes may actually take place. The question may well be asked by the doubters, and we are glad that we have such doubters, "Does this actually take

7. Bunting, R. W., and Rickert, U. G: Dental Caries, *J. N. D. A.* 2:247 (Aug.) 1915.

place in the mouth?" We grant that the evidence is not conclusive. The nearest approach to natural conditions so far substantiating the experimental results stated above was demonstrated by an experiment we did some time ago. For this experiment we selected twenty teeth having definite areas of visible enamel changes, actually produced in the mouth before extraction. The enamels were set up as cells and tested for permeability. A solution with osmotic pressure somewhat above normal blood was placed on the pulpal side. Normal saliva so treated that it held a slight increase of calcium phosphate was placed on the outside. The solutions were changed daily, and the tubes were kept in motion. The teeth were washed in tap water each day and these solutions were also treated with mild antiseptics. After several months one such area of change had completely disappeared; others gave evidences of slight favorable change. Head[8] reports similar results experimenting with areas changed artificially by weak organic acids. We will have the final clinical proof only when the lime content of blood and saliva can be controlled at will by the therapeutist.

3. *Specific gravity.*—We were aware of the fact that Black concluded from his classic experiments that the immune and susceptible dental tissues, with special reference to dentin, were of approximately the same density. We were also aware of the technical difficulties of making accurate specific gravity determinations. The largest specimens of pure enamel obtainable are so small and irregular in shape that this, coupled with the slight absorbing capacity, makes accurate determinations extremely difficult. The several methods we tried did not give us the satisfactory results desired. Errors when duplicate sections of enamels of the same tooth were taken seemed almost to equal the actual slight variations in density. We shall try, during the coming year, to refine our technic. Enough was done, however, to lead us to believe that there is a difference of specific gravity significant enough to be considerably greater than the technical error. Judging from the actual loss of enamel, as determined by weighing the specimens before and after remaining in distilled water for sixty-day periods, there should be an appreciable drop in specific gravity after the second weighing.

8. Head: *Dent. Cosmos,* January, 1910, p. 46.

Conclusions

From the results stated above, it is evident that a portion of all enamels is soluble in aqueous solutions, leaving a calcium phosphate content below saturation. It is also highly probable that salivas of the lower content remove calcium phosphate from enamel, resulting in a weakened structure. It is also evident from the above that the enamel is a permeable structure requiring a period of years for the most complete development; that permeability decreases to a certain limit with age, with the possible exception of stress periods when there may be an increase of permeability, granting that the latter is still wanting in definite proof, and that the most soluble portion suggests at least the changeable part of the enamel structure. It is also suggestive of how the initial stages of dental caries may be produced during stress periods. At least two experimenters have had a measure of success in inducing favorable changes in partially decalcified enamel areas. Finally, the experimental study directed toward the control of the lime content of the blood and saliva appears to be a most rational and most promising angle of attack for the control of dental caries.

PHYSIOLOGIC CHANGES IN THE STRUCTURE OF THE ENAMEL AFTER TOOTH ERUPTION*

By THEODORE B. BEUST, M.D., D.D.S., Louisville, Kentucky

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THAT which is necessary for the proper utilization of a recognized truth is the stamp of popular approval. Simple recognition of facts by a few will not create advances in science. Much knowledge that has been thrust upon a minor number of observers awaits the verdict of the masses.

Many still adhere to the belief that anabolic changes cannot occur in the enamel of an erupted tooth. This conviction is so radically established that when in 1912 the report[1] of my experiments demonstrating a movement of fluids from the dental pulp into the enamel tissue appeared, little or no interest was displayed by those who frame the trend of professional thought. Notwithstanding later contributions by Bodecker and Bunting and the lapse of nearly twelve years, the older conceptions, as evidenced by the last edition of Tomes' Anatomy[2] still appear to prevail.

In the beginning of the nineties, Bodecker, the elder[3], von Ebner[4], Morgenstern[5], and later Caush[6] showed that protoplasmic enclosures within the enamel, of sufficient magnitude to maintain metabolism, existed. This point of view has since been either sharply combated or at least met by passive resistance by Williams[7], Black[8], Broomell[9], Noyes[10], and many others, general support never having been given such findings.

The aims of this paper demand a brief rehearsal of known ideas, for which indulgence is pleaded. The arguments which have combated the occurrence of vital phenomena within the enamel tissue may be outlined as follows: (1) the assumption that the enamel is severed from the systemic circulation by the disappearance of the enamel organ and other vascular structures as a consequence of tooth eruption; (2) the assumption that the enamel lacks continuous or communicating channels or other inclosures by which a metabolism can be entertained, and (3) the contention by Black, Pickerill, and, until recently, Williams, that normal enamel will not admit staining fluids.

A brief inquiry into each of these three subheadings will illustrate the problems involved.

1. *The severance of the enamel from its original supply of nourishment by the process of tooth eruption.*—You will recall that the enamel is developed by

*Working under grant from the Research Commission of the American Dental Association, University of Louisville College of Dentistry.

1. Beust, T. B.: *Dent. Cosmos,* June 1912, and *Archiv. f. Zahnheilkunde,* I and II, 1912.

2. Tomes: Anatomy, Ed. 8.

3. Bodecker, C. F. W.: Anatomy and Pathology of the Teeth, N. Y., 1894.

4. Von Ebner, quoted in Tomes: Anatomy, p. 52.

5. Morgenstern, M.: *Corresp. Blatt f. Zahnarzte,* 1899.

6. Caush, D.: *Tr. Fourth Internal. Congress,* Vol. I.

7. Williams, Leon: *Dent. Cosmos,* 1923, p. 292: 1896 to 1902.

8. Black, G. V.: *Dent. Cosmos,* Feb., 1916, p. 140.

9. Broomell and Fischl: Anatomy.

10. Noyes and Thomas: Dental Histology and Embryology.

the ectodermal hood known as the enamel organ and that, according to present opinion, it is completely formed before the tooth is erupted. Late in the preeruptive period, after envelopment by the dental sac, the enamel-forming cells become functionless, thus removing the enamel from its original source of nutrition. On eruption of the tooth, moreover, the closely applied layers of the dental capsule are stripped off, resulting in complete disruption of all vascular connection with the soft tissues. According to current theory, the enamel is now believed to be devoid of vascular channels and unalterable, except by pathologic processes. This point of view can, in the light of recent investigations, no longer be upheld. Although one possible source of nourishment may have been removed, a second source, equally efficient, supersedes it. Indeed, it is probable that the second has made its appearance concomitantly with the first, as I shall presently attempt to illustrate.

2. *The assumption that the enamel of the erupted tooth is segregated from all trophic centers through lack of communicating channels.*—If we examine carefully into the developmental processes concerned in enamel formation as exhibited by various classes of vertebrates, we are forced to conclude that all enamels are analogically, homologically and, with minor deviations, morphologically identical. The genetic relationship of all may be gathered from the similarity of the enamel organs and the fact that the initial steps in tooth formation, not excepting those animals which possess no appreciable enamel tissue, such as some teeth of fishes, snakes, frogs and other animals, is characterized by the universal development of an enamel organ. So completely does the embryologic growth in the various mammals concur that inferences drawn from one are transferable to all. Such a procedure parallels the custom followed in comparative anatomy, by which brilliant results have been attained.

The first structures to which I desire to call attention are the easily demonstrable protoplasmic communications existing between the dentin and enamel in the teeth of many fish and lower mammals, such as some species of carnivora, marsupials and even in the teeth of some primates.[11] The continuity of the communications, though less evident in human teeth, are so apparent in the lower forms that the intimate relationship between the enamel and the dentin

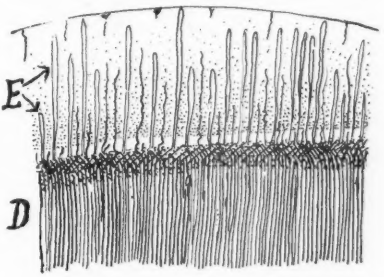


Fig. 1.—Enamel of *Mephitis* (skunk); the magnitude and number of the protoplasmic processes found here have never been commented on; *E*, processes of the dentinal fibrils extending into the enamel.

must be revealed to any skeptics who take pains to study them (Fig. 1). Identical formative organs producing identical structures with identical functions are certainly comparable. Why, therefore, should we not expect such communications in the enamel of man? They have been pictured often enough but have generally been misinterpreted. According to Tomes[2], the protoplasmic connections here referred to are uncalcified persisting processes of the ameloblast. The ameloblastic and odontoblastic layers being in continuity at the beginning of calcification, we must logically assume that natural channels of com-

11. Carter: *Proc. Zool. Soc. of London* 1922, quoted in *Dent. Cosmos*, June, 1923.

munication between the enamel organ and papilla, comparable possibly with the intercellular lymph spaces of the epithelium and certain other structures, existed at all times. This view may be supported by the fact that the enamel organ rarely, if ever, contains blood vessels. I believe that these communications are functional in the dental organs of man and that they act as channels for metabolic fluids and undergo progressive calcification, as do the dentinal tubules, with increasing age.

Fig. 2.—Tooth model

Fig. 3.—Tooth model

This communicating substance is represented by the characteristic markings seen in cross and longitudinal sections of human teeth. The most conspicuous figures in the enamel are those known as the spindles and tufts, which appear to spring from the amelo-dentinal junction. We see also the rods and the controversial substance surrounding or limiting them.

Various interpretations have been advanced as to the nature of the spindles, which have generally enjoyed the reputation of being connected with the dentinal fibrils and being filled with protoplasm. The "tufts", which present themselves in cross sections of teeth as diverging fibers with their apex on the amelo-dentinal boundary, have been mostly regarded as defects, or as compensatory fissures. As it is in many cases impossible to differentiate between a sectioned "spindle" and a sectioned "tuft," I shall, for the present, consider them as identical. I believe that the functions of these structures are the same as those of the communications observable in lower animals, and that they are represented by a system of capillaries of hitherto unsuspected magnitude.

Before proceeding, I shall present my views on the microscopic anatomy and distribution of these structures in human teeth. Careful investigations have convinced me that these have been misnamed, misunderstood and misconceived as concerns their morphology. In 1912, I photographed them in cross and longitudinal section and pronounced them to be avenues through which nutriment

traveled from the pulp cavity, by way of the dentinal tubules, to the ultimate recesses of the enamel. As cross sections of the enamel rods distinctly show, they do not spring from a common center but they occur as long lines, interrupted by closed areas of rods, generally running parallel with the plane of the long axis of the tooth. An idea of their distribution can be had by viewing, in Figs. 2 and 3, a model (as yet incomplete) of this fabulous wealth of capillaries. The topography of the dentinal outcrop shown is the result of observation of enamel

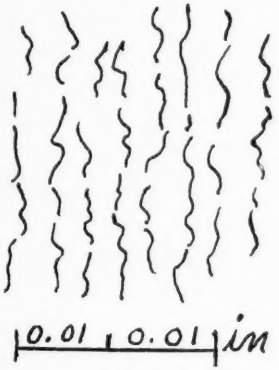


Fig. 4.—Cameralucida tracing of the parallel protoplasmic communications; from a cross section of the enamel rods.

cross sections and represents diagrammatically the conditions as they must exist. From ninety to 200 of these rows must be present, the lesser number applying to teeth of smaller circumference. The rows are so close, their terminal continuations so extensive and their gyrations (neither of which are shown on the model) so pronounced that their arrangement on a model with all these parallel processes in place could not be seen. The model, therefore, was constructed for the purpose of showing the general trend of these communications, its rows being neither complete nor sufficiently close to one another.

By the tracing shown in Fig. 4, an idea of the dimensions of the rows and their segments can be had. A cross section, of a tooth would make these rows appear as tufts while a longitudinal section enclosing one or several rows and exhibiting their sectioned windings, would present the phenomena of the striae of Retzius.

I think that these protoplasmic communications should be called the "parallel communications" in order to differentiate them from others which undoubtedly exist.

3. *The contention that normal enamel will not admit staining fluids.*—Obviously, a tissue that excludes the entrance of any of our stains will probably bar also the entrance of nutrient fluid, such as lymph. Black[8], Pickerill[13] and, until recently, Leon Williams[7] strenuously claimed that normal enamel will not stain. "Normal" in enamel literature has always been an ominous appellation. From the point of view of constancy or numerical frequency, we can unequivocally pronounce these communicating figures as "normal," as they occur in 100 per cent of human teeth. (We must also pronounce the permeable substance of the rods of recently erupted teeth normal, for observation has shown that, with increasing age, it becomes less permeable.)

While investigating the problems of caries immunity in 1911, it occurred to me that if it could be shown that stains could find their way from the pulp cavity into the enamel, to the exclusion of all entrance of stain from without, the question of enamel vitality would need little further substantiation. These were the first experiments ever made to stain the enamel through the dentin and their success constituted the first practical demonstration of the possibility of a flow from the dentinal fibrils to the enamel figures. The conclusions arrived at at that time were published in

13. Pickerill: *Dent. Cosmos*, 1913.

various journals and their purport may be deduced from citations from the Dental Cosmos[1], 1912, and, later, in 1914.[14] I contended at that time that:

1. "The lines or canals seen by former observers are channels through which plasma can reach all parts, generally speaking, of the enamel of erupted teeth.

2. "The enamel is vascular to a varying, sometimes to an extreme, degree.

3. "The rods in recently erupted teeth stain, which substantiates our claim that tissue changes take place in the enamel of erupted teeth."

Pickerill[13] and Bunting[15] were unable to duplicate my experiments, while Marshall[16], having had no success with what was termed my injection method, succeeded in another way. Contrary to the inability of these three investigators to corroborate my findings, Bodecker[17] recently adopted and successfully utilized two of the methods evolved in my research. Bodecker's published conclusions, moreover, obviously embody all of my contentions, so that we have at least in one instance a complete substantiation of my work which, in turn, reciprocally has contributed largely to the verification of the claims of the elder Bodecker[3].

It sometimes happens that the enamel will not stain. This may be due to such causes as insufficient exposure to the staining fluid, complete obliteration of the lumen of the enamel canals through calcification or faulty technic. Of course, we must apply what we have acquired from our experiences in physics and not expect a penetration of fluids that are on equimolecular footing with the contents of the canals, or expect an alcoholic stain to diffuse down into a water-soaked tooth or an aqueous stain to diffuse up into an alcohol-soaked tooth in a reasonable length of time. It must, moreover, be borne in mind that an object placed in any staining fluid will not necessarily stain. Little-known factors determine the results in most cases. Repellent electrical charges, the presence of electrolytes or the behavior of the enamel content as a semipermeable membrane may be effective. The stainable structures of the enamel stain best with basic dyes and probably share the properties of cellular structures in being negatively charged. Enamel stains, although with difficulty, with alcoholic eosin and acid fuchsin; so, therefore, it may be said to be amphophylic.

Developmental Stages in Enamel Calcification

During the progress of this work ten years ago, a variation in the susceptibility of the enamel of different teeth for stains became evident[14]. This observation suggested a division of the stages of enamel calcification. In a paper read before the Jefferson Dental Society held in Louisville, Feb. 15, 1923, I recommended a division into three periods:

"The time from the beginning of calcification to the period of normal eruption may properly be termed the *protrophic* stage. The period extending from the time of eruption to maturity could be called the mesotrophic stage; from thence on to senility we would have the *telotrophic* condition. Owing to the variability of physical development these three stages are poorly demarcated and will vary under certain conditions, such as pregnancy or from pathologic processes."

These three divisions may be shown to exist both chemically and by the staining method. Experiments in this con-

14. Beust, T. B.: *Dent. Cosmos*, Feb., 1914, p. 201, and *Dent. Brief*, 1913, p. 856.

15. Bunting, R. W., and Rickert, U. G.: The Tooth, a Permeable Membrane, *J. N. D. A.*, 5:519 (May) 1918.

16. Marshall, J. S.: *Items of Interest*, March, 1919.

17. Bodecker, C. F.: Permeability, of the Enamel in Relation to Stains, *J. A. D. A.* 10:60 (Jan.) 1923.

nection are still in progress, and I offer for illustration the following experiment:

To determine the progress of calcification in a growing tooth, an examination of the relative permeability of a growing rodent incisor was undertaken. Obviously, the least developed part of the enamel of such a tooth, when subjected to the staining process, would stain more intensely, and would so give a clue to the respective sclerotization of its parts as the tooth grew forward. To this end the mandible of a ground hog, (genus *Marmota*), which measured 7.6 cm. from the angulus mandibulae to the tip of the incisor, was fixed in alcohol and,

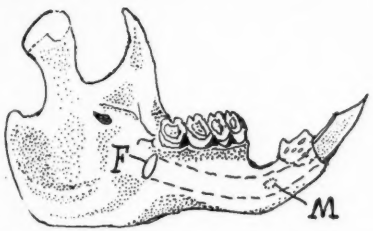


Fig. 5.—Mandible of ground hog (genus *Marmota*); *F*, apical foramen; *M*, location of mental foramen.

after removal of the ramus and superimposed molars, stained in toto in a strong alcoholic solution of fuchsin for eight days (Fig. 5). The incisors of this specimen were approximately 5 cm. long. Such a preparation seemed to offer advantages for an attempt of this nature, presenting as it did the following features: (a) the exposed and completely calcified, relatively impermeable part of the tooth extending from the gingival margin to the cutting edge, which being immediately exposed to the staining fluid would, if at all stainable, display penetration; (b) a part protected from without by bone and soft tissues and from within by a body of dentin, which in these animals is exceedingly dense, approaching near the incisal an enamel-like consistency. This protected part would then stain only in ca.: its tissues displayed a high degree of capillarity.

Fifteen serial sections were cut and ground from this tooth. All stages of enamel calcification, as judged from the point of view of permeability, were illustrated. Naturally, the limitations of the developmental stages outlined above for human teeth cannot obtain here. The earliest protrophic stage, characterized by total obliteration of all tissue markings by the stain was that portion

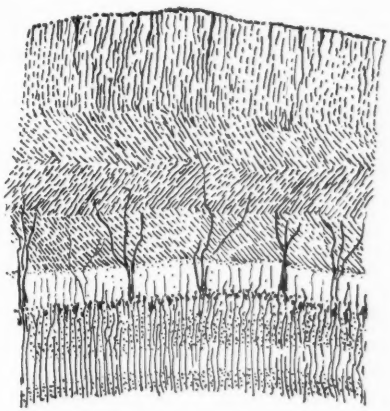


Fig. 6.—Mesotrophic stage; the inner one third of the enamel and the dentin was here uniformly stained; cameralucida tracing; ground section; Oc. 15; Ob. 16 mm.

of the tooth extending from the root apex to a point immediately below the deciduous first molar. The intermediate mesotrophic stage, represented by that portion of the tooth extending from the deciduous molar to a point anterior to the mental foramen, was evidenced by the presence of protoplasmic communications (Fig. 6) and gradations between partial and uniform permeability of the inner regions of the enamel (through the dentin; wherever the dentin conveyed the stain, the inner enamel layers were uniformly stained). The telotrophic stage, being that portion of the tooth extending from a point about

midway between the mental foramen and the alveolar border to the incisal, refused to stain, the protoplasmic communications being almost or entirely invisible.

Here, as is the case with human enamel, irregular permeation of the outer enamel layers was found, which, however, was exceptional.

The fact that the inner layers of young enamel frequently stain to the exclusion of the outer layers indicates the occurrence of, as Bodecker[17] aptly terms it, a secondary calcification.

The outstanding impression gained from observation of these sections is that the final sclerotization is not solely in the outer enamel layers, but largely in the inner, which, of course, is contrary to common belief[18].

18. Attempts have been made to correlate changes in the enamel structure with influences acting on this tissue from without. Possibly changes may be induced in enamel analogous to those investigated by Rainey and Harting[12] and Head[12] through its immersion in such physiologic fluids as the saliva. This experiment shows, however, that alterations occurring in the enamel of the erupted tooth are referable mainly to influences coming by way of the dentinal tubules.

These experiments harmonize in detail with the experiences with human teeth and corroborate the convictions gained in 1911.

Conclusions

1. Calcification by the enamel organ in the late protrophic stage (pre-eruptive) is largely supplemented by a flow of metabolic fluids from the dentin.

2. Calcification, as contended in 1914[14], continues during the (mesotrophic) posteruptive stage from within, as shown by the relative permeability of the enamel of teeth from subjects of varying age.

General recognition of these contentions would permit the approach of various problems, such as the question of caries etiology, caries immunity and mottled enamel etiology, from an entirely new point of view.

12. Rainey and Harting, quoted in Tomes: Anatomy, p. 160. Head: *Dent. Sum.*, July, 1913.

THE PERMEABILITY OF ENAMEL IN RELATION TO STAINS*

By WILLIAM G. SKILLEN, D.D.S., Chicago, Illinois

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE staining method for determining the permeability of enamel was selected because, short of the intra vitam method, or injection of the living animal with suitable dyes, we regard it as giving possibly more accurate proof than such a method as was used by Bunting[1], owing to the fact that its reaction is visible.

Experiments of various kinds have been carried on for the last three years, by this method, some in connection with permeability of the root tissues, others with regard to enamel alone. During

*Working under grant from the Research Commission of the American Dental Association, Northwestern University College of Dentistry.

1. Bunting, R. W., and Rickert, W. G.: The Tooth, a Permeable Membrane, *J. N. D. A.* 5:519 (May) 1918.

this time 300 teeth, freshly extracted, temporary and adult, of various ages, have been used.

In several of the experiments we ran, the results were similar to those obtained by Marshall[2], staining in vacuo, for example, the enamel ampules at the dento-enamel junction being stained by the passage of the dye through the dentinal tubules. But beyond this point the stain would not go, so that the enamel itself was not affected. When Bodecker's[3] article appeared, showing that he was working along similar lines but with very different results, we redoubled our efforts, but, up to the present time, without avail. We have not succeeded in forcing the dye beyond the point mentioned.

Neither have we been able to stain the enamel by immersing the crowns of teeth in the dye, obtaining only the merest hint of success after we had disked off one or more surfaces so as to remove, possibly, the so-called Nasmyth's membrane. The color was so faint, however, that in the ground specimen it became invisible, and we finally decided that it was nothing more than a shadow. Staining in vacuum, and in vacuum with pressure, gave no different results.

This result would therefore tend to show that there is no organic matter in enamel beyond the ampules, and, in addition, an absence of circulation, which coincides with the results obtained by staining intra vitam (Marshall[4], Wellings[5], Black[6], Walkhoff[7] and Williams[8]).

Dyes

The dyes used were Zenker's solution, which gave such good results in dentin and cementum, eosin, safranin, methylene blue, and a solution of equal parts of 50 per cent alcoholic solutions of crystal violet and brilliant green. As far as the dentin was concerned, we found that the latter combination had the greater penetrability, often infiltrating the entire dentin in a few minutes, so that we resorted to this dye entirely toward the end.

Technic

Although three experiments were performed, we pinned most of our faith on that part of the first experiment in which infiltration from the pulp chamber was tried, as that more nearly represented what, if anything, is the natural method. This method gave all the results that have been described.

Experiments

Experiment A. Part 1.—Freshly extracted teeth were simply immersed in the staining solution.

2. Marshall, John S.: A Contribution to the Study of Human Enamel, with Special Reference to Its Nutrition, *Items of Interest*, 41:216 (March) 1919.

3. Bodecker, Charles F.: Permeability of the Enamel in Relation to Stain, *J. A. D. A.* 10:60 (Jan.) 1923.

4. Marshall, John S.: An Experimental Study with Certain Vital Dyes of the Persistent Teeth of the Albino Rat, *J. Dent. Res.* 2:12, 1920.

5. Wellings, A. W.: The Staining of the Dental and Adjacent Tissues of Some Rodents by Means of Trypan Blue, *Dent. Cosmos* 57: 1062, 1915.

6. Black, G. V.: Operative Dentistry 1: 122, 1914.

7. Walkhoff, Otto: Advances in Demonstrating the Finest Details of Tissue Structure, with Especial Reference to the Development of Human Enamel, *Dent. Cosmos* 65: 160, 1923.

8. Williams, J. Leon: On Structural Changes in Human Enamel, with Special Reference to Clinical Observation on Hard and Soft Enamel, *Dent. Cosmos* 40: 505, 1898.

Part 2.—Cavities were cut in the teeth, the pulp chamber and canals were reamed out, and the apexes were opened up. They were then immersed in the dye which had thereby free access to all parts.

Part 3.—Cavities were cut, and the canals were reamed out. The apexes were then dried out and sealed and the teeth fastened to the bottom of a dish by paraffin, the crowns upward. A thin pipette was then used to carry the dye into the canals and pulp chambers. Infiltration was from within outward.

Part 4.—Teeth were set up in a dish as in Part 3, but were not opened up, in an attempt to have the dye pass in from without.

Part 5.—The procedure was the same as in Part 4, but with one or more enamel surfaces disked down so as to remove Nasmyth's membrane, leaving other surfaces undisked as a check.

Experiment B. Part 1.—The apexes of the teeth were cut off, the canals and pulp chambers were reamed out and, with a pipette, were filled with the dye. The end of the root was then sealed with cement and the teeth mounted, crowns down, in cement on metal blocks. Only enough of the crown was covered to give a firm attachment. These were then placed in the vacuum jar.

Part 2.—Teeth were prepared as in Experiment A, Part 3, filled with the dye and sealed as just described. After mounting in the same way as described above, but with the apexes down, they were placed in the vacuum jar.

The air was exhausted until the mercury registered from 25 to 30 mm. This condition was maintained for varying periods of from ten minutes to overnight. Again, it was repeated four or five times in succession.

Experiment C.—This experiment, consisting of a combination of vacuum and pressure, was carried out as follows: The apical end of the tooth was ground down until a thicker portion of the root was reached. The canal and pulp chamber were reamed out and a hypodermic needle was inserted and cemented to place. The root was then worked through a piece of rubber stopper shaped up so as to fit tightly into the end of the vacuum tubing. The joint was then cemented. This arrangement left the crown of the tooth free in the vacuum tubing. The tubing was attached to the pump, and the syringe was filled with dye and attached to the needle. While the pump worked, pressure was exerted on the syringe.

Discussion

Vida A. Latham, Chicago, Illinois: Work in dental histology calls for a better knowledge of chemistry and reactions of dyes. We are trying to standardize the dyes used in laboratories which the Aniline Dye Committee and Dr. Conn, the chairman, have advised. For example, the term "fuchsin" does not indicate the type of stain. Magenta *is* a fuchsin, but it is not the stain that would do for tuberculosis. Caush has used a fuchsin stain, which is rubin, and got successful results.

The circulation of the enamel from the pulp through the dentin I thought had been proved some years ago. In my work I have shown it over and over again in the enamel and cemental areas. It may be done by using some of the metallic dyes. Papers have been published, but unfortunately more often in the medical journals than in the dental. Those observations were verified by Retzius, Römer, Morganstern, Beale, Walkhoff, Lepkowski, Howes, Paulton and Hoyer, who have demonstrated circulation. I suggested some years ago that specimens which had been hanged would be very good material to offer natural injections through strangulation or pressure. I have found that some of the metallic stains react on enamel, and especially in the vitrified or older stages of growth. Caush used a rubin dye. This did not follow the circulation. It did follow the so-called interglobular spaces. Whether those interglobular spaces are safety valves or lymphatic spaces, we have not yet determined. We are not sure

of their use. They might be analogous to the ventricles of the brain as a pressure reliever, or lymphatic spaces, and they would easily take prismatic stains. But there is another point that I think you will have to watch closely. Some of these fibrillae, having lost their protecting coats, will stain because they take in the prismatic stain whether you are using the rubin dye or not, especially if nerves.

There is some danger in using the word "fibril," because it indicates, as a rule, nervous structure more than arterial. Care must be used, because the stain may not react on the entire nerve, due to its sheathing, but may react on its terminal fibrillae, and therefore shows stain, and they are possibly more nervous than capillary.

The circulation in teeth has been noted, showing penetration to the junction of the enamel and cemental layer, as well as the enamel surface. Photographs and slides have been shown and reported, demonstrating these facts. I am glad to see that the work we did in a Chicago group many years ago has now been confirmed, as evidenced by a paper recently published on the nervous anatomy of the pulp in the last number of the *Dental Cosmos*. Photomicrographs were given showing the nerve polar bodies just as we demonstrated. The vasomotor system of the pulp and its relation to Raschkow and Boll's plexus, which penetrates the odontoblastic part of the pulp into the dentin and enamel, has also been demonstrated. Enamel injections prove these points. It is also wise to use low pressure for a long time, gradually increasing it to force the circulation of the blood into the enamel, by any of the injection methods known.

Russell W. Bunting, Ann Arbor, Michigan: Dr. Rickert and I have been very much interested in the paper by Dr. Skillen in which he says they failed in their study to reproduce the results we obtained by forcing materials through the tooth by osmotic pressure. I would like to have Dr. Ricker describe the ways he took to forestall many of the criticisms made on the method which we employed. Dr. Rickert did all of the physical and chemical work which was involved in the demonstration reported by us some time ago. I, myself, think that there is one place in which this group of investigators with the method of dyes may be misled. I saw a demonstration made in New York City some time last winter by a man in the East, who attempted to show that it was impossible to stain the enamel. At the same time Dr. Leon Williams showed his work, in which he stained enamels readily by simple diffusion, using neutral silver nitrate solutions. His work showed that the soft forms of teeth were stained readily, and the harder forms of teeth were not stainable. At that time I showed sections which I had made showing exactly the same things.

Another speaker, by sections of teeth which had been subjected to stains and dyes, attempted to prove that enamel is impervious. As the sections were shown on the screen he pointed out how the enamel of the teeth was free from stains. The interstices in the enamel are so small that any amount of dye that enters by percolation is very finely divided, so that when the section is subjected to a washing and grinding, the chances are that this dye will either be washed out or will be so diluted in its refractive effect that it will not be easily apparent to the eye. Silver nitrate when it enters these spaces is clearly apparent, because it has such a high index of refraction.

U. G. Rickert, Ann Arbor, Michigan: In answering the questions in Dr. Skillen's criticism of our work, I would say that before this work was published we were aware of the fact that the very criticisms he referred to might be raised. We are not ignorant of the fact that we can take a plate of glass, heat it, throw a spray of water over it and use it as a membrane and develop a certain amount of pressure. In order to be on the safe side, we took, very carefully, sections small enough to be fully examined microscopically before we used them. Of course teeth taken out and left lying around in a laboratory would be altogether unfit for this work.

Another point to offset this argument is the fact that these older teeth would be just as subject to breaks or flaws in the enamel as the younger ones. We do get older ones in which there is practically no permeability. It is strange if all the old enamels which have withstood the forces in a mouth for long years do not show any degree of permeability as compared with the teeth of younger persons. That alone offsets these criticisms. When we stop to consider the size of the canalicular spaces that were referred to, Dr. Bunting is, in my opinion, justified in placing absolute dependence on dyes alone, because from the amount of pressure used we know that the spaces are considerably less than ½

micron. Many of the dyes in sections so small would be washed out or be so finely thinned that it would be difficult to observe them by microscopic examination.

Dr. Beust: In 1912 I published the first of these experiments. Doubts have here been expressed concerning the proof of the presence of the stain in the enamel. The best way out of this dilemma is to examine my preparations. Even laymen must testify that the enamel is stained. I used fuchsin; Bodecker used safranin. Other stains may be used. Failures appear to be due to the fixation. In regard to fixatives, we are at a great disadvantage, as many hardening fluids also decalcify. Alcohol used in graded concentrations, grading up and down, cannot injure the tooth for these purposes.

A very young tooth should stain in from three to four hours; older teeth will require many more. Comparisons are possible only if the time of exposure to the stain is standardized. Ten days would seem to be the correct time for alcohol-fixed teeth, using a strong alcoholic stain. The best method is the bottle-cork method, apparently, in which the tooth is cemented into the cork of a bottle containing stain, as described by me in 1912. The alcoholic stain will diffuse up very readily. After that acid-free paraffin oil is ground in.

Concerning the nomenclature, I should like to say that the use of the appellation *dental fibril* is not original with me.

My results, of course, are opposed to those of Dr. Skillen. His so-called defects exist in every tooth. Leon Williams says that there is no perfect enamel. Formerly, since the middle of the nineties, he claimed that all enamel was inorganic and unstainable, but recently he has changed his views. These "defects" have no influence on the results in staining by the bottle-cork method.

Weston A. Price, Cleveland, Ohio: In the research work in our laboratory in the last few years we have made some progress demonstrating that the size of the ion determines quite largely the extent to which it will penetrate an enamel membrane. Ionic calcium will pass very readily and rapidly through the enamel structure. It will also pass through the dentino-cemental boundary. That immediately has a striking bearing on the factors brought out in our first paper. I find, as Dr. Rickert brought out, that it was very easy to demonstrate changes in weight of the different specimens. We could increase or diminish the weight by changing the concentration of calcium in the solution. We have here a physical law.

Another point I would stress is that the changes that we record by passing light through a section may be exceedingly deceiving. There are many things that you can do to a section of enamel and change the effect produced by passing light through it. It is not so simple a thing as cutting sections and comparing one with another. We will ultimately have to make our examinations with a monochromatic light, and under control conditions, if we are going to determine the effect of heat or chemicals.

BRIDGEWORK FROM A PERIODONTAL STANDPOINT

By ANDREW J. McDONAGH, L.D.S., D.D.S., Toronto, Canada

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE title of this paper might lead one to think that the periodontist's view is different from that of any other dentist, so far as bridgework is concerned. As a matter of fact, all the different specialists of dentistry, as well as the general practitioners, must work for one common end and that end must be the greatest good to the patient. Every specialist is apt to regard his specialty as the most important. As a consequence, great care is necessary on his part not to overlook the benefits derived from, and the necessity of, all other departments of dentistry. In this paper, although particular attention will be paid to the periodontal tissues, the comfort and appearance of the patient must also be considered.

To a certain extent, it is the style today, and has been for some time past, to criticize adversely fixed bridgework and to boost all forms of removable bridgework, the principal reasons given being the health and preservation of the periodontal tissues, but I doubt very seriously whether this teaching has not been greatly overdone. Sometime during last year questions were sent out to many of the leading dentists of the United States by *Items of Interest* asking their opinion regarding the effect of fixed bridgework on supporting tissues. It was surprising to note how nearly unanimous the verdict was condemning fixed bridgework, the answers being usually based on theory and the present-day teaching of pathology. In the face of this sort of evidence, it may be well to present the other side of the story.

It is the province of the periodontist to study the periodontal tissues and to know the effect of all forces and conditions on these tissues. In this connection, the forces used in mastication and the other movements of the mouth play a great part in his studies, and he has come to understand the fact that the movements of the mouth, when properly carried out, are of very great assistance to him in his work; he studies also that the forces used in the excursions of the teeth, that is, while the teeth are in the process of eccentric occlusion, produce a baneful or beneficent effect. This holds good if the teeth are natural and thirty-two in number or if some of them are replaced by bridgework, by inlays, or by partial or full dentures.

Nature in supplying us with thirty-two teeth (provided she is not interfered with) gives us a perfect occlusion as shown in Fig. 1. The cusps are not too long and not in abnormal positions; thus we have no traumatic torque in eccentric occlusion, and no undue leverage of any kind. To speak of the cusps occluding in normal occlusion is much better than to say interlocking, because interlocking gives a wrong impression. The term "interlocking" may well be used under certain conditions. For example, if the teeth are not normal to begin with, or if we have them ground by an unnatural habit so that they interlock as in Fig. 2, where there is perfect wedging of one tooth into the cusps of

another, the lateral force such as there always is in eccentric occlusion will bring these teeth into contact as in Fig. 3, and the force exerted will be along the line *ab* and at a definite angle to the long axis of the tooth. This, of

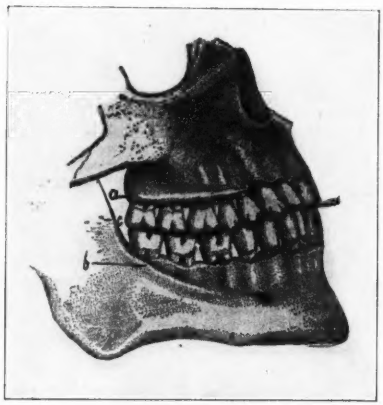


Fig. 1

course, is not normal and will cause an unnatural or unusual leverage, resulting from traumatic torque. This condition not only occurs in natural teeth, but it

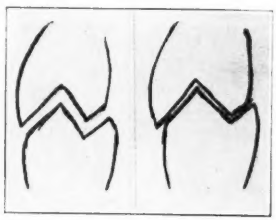


Fig. 2

is copied, we may say, and reproduced in many pieces of bridgework.

Another condition which the periodontist has continually to deal with is that of a large molar tooth, the surface of which has been ground flat from constant or pernicious use, as shown in Fig. 4. It is not difficult to see that a tooth ground in this way does not lend itself to the best results in the process of mastication, a traumatic torque resulting and eventually an injurious leverage. This condition again is reproduced in many crowns and also in bridgework. We find that both these conditions are comparatively easily rectified, particularly in natural teeth. For

Fig. 3

instance, in the case of the bicuspids which were interlocked and wedged together, simply by rounding off the cusps, as shown in Fig. 5, the whole condition is changed, the line of force of mastication being carried nearer to the long axis of the tooth, demonstrated in Figs. 6 and 7. One should note the change of the forces used in the molar tooth

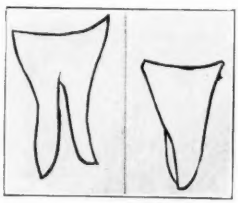


Fig. 4

when that tooth is ground to more nearly normal shape, as shown in Fig. 7. In such cases, the periodontist finds immediate and wonderful benefit resulting to the periodontal tissues, no other treatment being necessary after correcting the traumatic torque.

If too much of the periodontal tissue has not been destroyed, restoration to health and stability is a matter of a very short space of time, the improvement taking place in from one to three days. These facts being known to the periodontist, naturally he examines every case of bridgework which does not seem to be "standing up" (as the expression

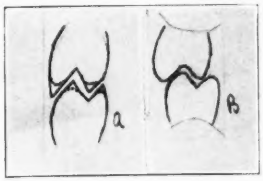


Fig. 5 Fig. 6

goes) to the satisfaction of the patient or himself. He examines them critically for torque or leverage, but in bridgework not only has the operator to take care of torque as we see it in a single tooth, but as the bridgework is of greater length than any one tooth, he must guard against leverages which may creep in on account of the length of the piece.

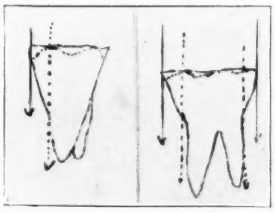


Fig. 7

A great deal has been written and said about traumatic occlusion and, we must acknowledge, not without cause. As you would naturally expect, the doctrine of traumatic occlusion has been very vigorously applied to bridgework, but the enthusiastic advocates of this teaching have been overzealous. When a writer tells us that if you put a bridge from a second molar to a cuspid tooth that bridge is sure to fail because those five teeth are going to do the work of the original teeth, and have the same force applied to them in mastication that the original natural teeth were created for, he is not taking into consideration many vital facts. Our mouths and teeth are placed in sensitive sockets.

The periodontium is composed of sensitive living tissue, which fact must be and often is not taken into consideration. Presuming that the five teeth spoken of above—the second molar, the first molar, the two bicuspids and the cuspid—are natural, healthy teeth and that a bolus of food is to be crushed by them, you will find that these teeth will stand just as much pressure as they are comfortably able to bear; if you increase that pressure, a feeling of discomfort or even pain will warn you to stop. In other words, they will carry just the load they are fitted for and no more. Now suppose we take the same bolus of food to be crushed by a bridge extending from the second molar to the cuspid: the two abutments which are carrying that bridge will stand just as much pressure as ordinarily they are capable of standing and no more. As soon as you exert too much pressure on them, as in the former case, you will be warned by a sensation of discomfort or pain, indicating that they will not take an overload any more than the original five teeth would. Whether they would as efficiently masticate a quantity of food in as short a time is another question. Therefore, the extraordinary amount of work that these abutments are called on to do or are supposed to be called on to do is not as great a factor in the case as we sometimes are led to believe. Leverage is very apt to be confused with overload, and the longer the bridge, the more likely is this confusion to occur. So many things are to be considered. For instance, if a bridge is made so that the force of mastication does not come ap-

proximately on a straight line connecting lines running through the long axis of the teeth, such a bridge is receiving an unnatural leverage, and the failure in such a case would probably be not from overloading the abutments, but would be as a result of traumatic torque or leverage.

To understand this question more thoroughly let us go back to some of our elementary histology in which we learned

Fig. 8

about the different fibers and structures of the pericementum. Figure 8 illustrates the strands and fibers which make up the pericementum. We note how Nature has adequately provided against a pressure in a line of the long axis of the tooth by the presence of a fibrous cushion at the apex of the tooth, assisted by the oblique and transverse fibers. The fibers at the alveolar crest (Fig. 9) and the transceptal fibers provide to a certain extent against luxation or torsion of the tooth; consequently, the weak point to be taken care of is in the lateral direction. The alveolar crest fibers seem to have had assigned to them a great part in protecting the tooth from this particular strain. However, Hopewell Smith tells us that as soon as the development of the tooth and its alveolus is complete, the alveolar crest starts to break down (Fig. 10). In confirmation

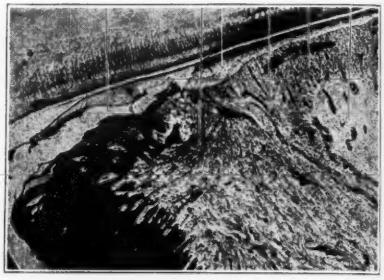


Fig. 9

of this teaching we have all observed in our roentgen-ray work that there are apparently very few, if any, persons, at the age of 30 years, with a perfect alveolar crest. Besides the fibers contained in the pericementum, there are lymphatics,

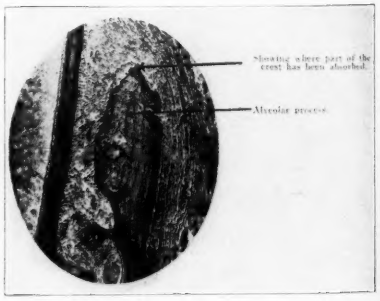


Fig. 10

veins, arteries and the smaller connecting blood vessels (Fig. 11). The pericementum on the lateral aspect of the tooth is not so constructed nor is it of sufficient bulk to protect adequately the vessels contained therein from a lateral force. This condition is accentuated as

age progresses. Figure 12 demonstrates radiographically the actual thickness of the pericementum, in contrast with the diagram shown in Fig. 10, showing the

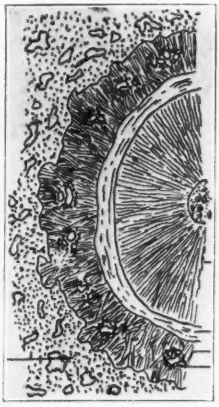


Fig. 11

oblique and other fibers. It also shows the alveolus after the crest has been destroyed, and the disadvantages that the vessels of the pericementum are laboring under in this case.

The arteries have an elastic coat, be-

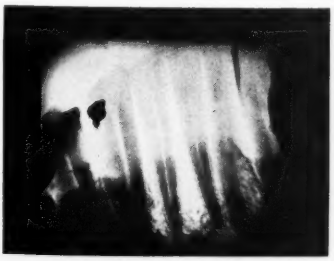


Fig. 12

sides the elasticity imparted to them by the force of the heart's action, so that it is a difficult thing to crush the sides of the arteries together. The veins and lymphatics have no such protection; consequently, they are not capable of recovering from a trauma as readily as the arteries are, and their function is thereby seriously interfered with.

Overloading the abutments of a bridge, particularly of a fixed bridge, is spoken of as a very common occurrence, and all failures of bridge abutments are apt to be attributed to this cause, but if one will examine the radiograms of all the full cases of teeth which come under one's notice, it will be evident that there are many causes other than overloading which are responsible for the failure of abutments of bridges;

Fig. 13

also in conjunction with radiograms, if one examines the occlusion to see whether or not there is a torque or leverage exerted on the occlusal surface of the bridge, one will probably come to the conclusion that we must revise our opinion with regard to the importance of the overload. Do we not, then, ever have an overload? In my experience in the molar and bicuspid region, the only time that I have seen abutments destroyed by overloading has been when a bridge on one side of the mouth has been made to open the bite, in which case one may look for trouble even if that opening is but the small fraction of a millimeter. As a consequence of this condition, and when an effort is made to close the teeth on the opposite side of the mouth, there is an unnatural stress

applied to the abutments of the bridge, which appears to act as a trauma. The same thing will happen to a crown which has been made to open the bite slightly, in which case every closure of the jaws is an accidental blow to the elongated crown.

Fig. 14

If overloading were as great a factor in fixed bridgework as we are sometimes taught, it is hard to explain the fact that every one of us has seen twelve and fourteen tooth bridges having only four or five abutments worn comfortably for a number of years, sometimes for as many as fifteen and twenty years. Unfortunately, men who have been in the habit of putting on bridges of this size are not the most conservative or scrupulous men, and they have sometimes used teeth for abutments which were not fit to support any bridge, in fact, which should have been extracted. Careful operators, as a rule, will not use or advocate a bridge of this extent because it is neither wise nor necessary, much better restorations being possible. I am simply mentioning the fact in refutation of the too widespread use of the word "overloading" as an explanation of the destruction of the periodontium. Figures 13, 14, 15, 16 and 17 are radiograms showing the abutments of bridges. Most of the bridges have been in for years.

Fig. 15

Fig. 16

Fig. 17

Often a bridge will bring into use a tooth or teeth which otherwise would not be used, and consequently through a lack of use would be thrown out by Nature. The healthy exercise which a bridge would give them and the exercise which mastication and the other functions of

the mouth provide not only acts as a stimulant to the tissues but is also used by Nature to help carry on her functions. This is particularly true regarding the venous circulation of the pericementum. As we remarked above, Nature does not provide the veins with the same mechanical help to drive the blood along in its course as is the case with the arteries. The venous circulation in the pericementum is greatly facilitated every time compression takes place in the direction of the long axis of the tooth. This pressure is not absolutely necessary to empty the blood vessels but it greatly assists whether the pericementum is the pericementum of the abutment of a bridge or not.

To digress for a moment: A study of the forces used in the act of swallowing is of great use to us in this connection. This act is performed 400 or 500 times a day apart from the many times it is performed during mastication, and the least pressure which is used in the act of swallowing, if the teeth occlude normally, amounts to about 8 or 10 pounds. It does not require a great stretch of imagination to grasp the probable benefits resulting from this very common and almost unconscious action whereby gentle stimulation is applied to the pericementum from thirty to fifty times an hour of every waking hour of the day. No amount of brushing or finger massaging is ever likely to take the place or have the good effects of proper swallowing, and I do not desire to underestimate the very great beneficial effects obtained by proper brushing and proper massaging. However, we must not lose sight of the fact that if the pressure exerted through faulty construction of the bridge or faulty formation of the teeth is in an abnormal direction, instead of a stimulant it becomes an irritant and "overstimulates", if you like, and the results will be injury to the periodontium.

Another argument used against fixed bridgework is that it prevents the natural movements of the teeth in their sockets. This leads us to inquire into the movements of teeth in their sockets. There are three directions in which a tooth may move: (1) it might sink into the socket, which we may call a vertical movement; (2) it might have a movement from the lingual or toward the lingual surface, which we may call a bucco-lingual movement, or (3) it might have a movement toward the adjoining tooth, which we may term a mesio-distal movement. I shall consider the mesio-distal movement first. We are taking it for granted that any movement of the teeth which should not be interfered with is a normal movement and provided for by Nature. However, Nature has so placed the teeth that the contact points of every tooth touch the contact points of every adjacent tooth mesially and distally, except, of course, the third molars. This establishes perfect contact from second molar region to second molar region and ideally leaves no room for movement; therefore, a movement in this direction can be disregarded. A bucco-lingual movement is possible and compression into the socket is also possible and can be actually shown to take place.

Let us now consider a bridge from the second molar to the first bicuspid, a very common and a very useful example of fixed bridge. When we cement this bridge in place, there is a possibility still of bucco-lingual movement; therefore, we do not interfere with that movement materially nor do we interfere with compression into the socket. As a matter of fact, if we believe in the doctrine of overloading, compression into the socket would be increased rather than decreased. The only movement that we would seriously interfere with is the mesio-distal movement, a movement which does not ideally exist.

So much has been written on this subject in condemnation of fixed bridgework that many dentists have come to believe that they are conferring a benefit on the patients by taking out all fixed

bridges and replacing them by removable appliances. There are apparently no half-way measures for this class of operators. They do not seem to consider the individual case; for them it is a crime to fasten two teeth together, in any way. Their solicitude for the health and preservation of the periodontium is so great that they throw common sense to the winds. Recently I saw a case where a bridge from the first bicuspid to the second molar was in place for twenty-six years. It was comfortable but fairly difficult to get clean on account of the rather short bite. The occlusion, however, must have been good, for both abutments were in good condition. The patient drifted into the hands of a young dentist who removed the fixed bridge and replaced it by what he termed a removable one, using a cast clasp with an occlusal rest on the molar and a wrought clasp on the bicuspid. In less than a year the molar had become loosened and the gum anterior to the molar was intermittently red and swollen. No doubt, the trouble there is due to faulty construction, but it is very hard to convince the patient that she has been benefited by having the fixed bridge removed.

This case is not an isolated one. There are many instances of patients who for years have been wearing fixed appliances quite comfortably being persuaded to make a change to the removable variety and who, as a consequence, have lost the abutments through the destruction of the periodontal tissues. The fault in some cases, no doubt, is with the dentist, who does not use good judgment in the kind of removable appliance he employs, or perhaps does not apply the right kind to that particular place. The result, however, is that the patient suffers, no matter where the fault lies. A removable appliance, bridge or plate, well made and placed with good judgment, in many instances is advisable and will not injure the periodontium. But how many of this variety do we make as compared with those which do an injury to the soft tissues? Then why do we resort to removable appliances in preference to fixed bridgework? Usually and principally because, as said before, fixed bridgework is dirty, and sometimes because the space under fixed bridgework, called the cleansing space, is an annoyance to the tongue and a hindrance to speech. So far as failure to perform the functions of mastication or to stand up under use is concerned, my observance has been that properly constructed fixed bridges do not fail. When bridges fail, they do so from the causes that result in periodontal destruction around teeth, whether they are bridged or not. In other words, if you have an unnatural leverage exerted on a bridge or on a tooth, you are almost sure, sooner or later, to have a disturbance ending in dental periclasia, not mentioning, in this connection, pulp canal operations.

This evidently is what happened in the case described above: the cast clasp grasped the molar tightly and the wrought clasp could move easily on the bicuspid. Every time a pressure was placed in the region of the second bicuspid, the soft tissue would yield and the denture would act as a lever on the molar, resulting at first in a traumatic torque, and, as the tissue gave way around the molar, a pathologic condition was established, which has been described previously in this paper and which will eventually result in the loss of this molar tooth. The same condition of things is observed when a bar extends along the alveolar ridge attached at one end to a tooth or possibly to two teeth adjoining one another and this bar is used to support and retain a removable restoration. This method of restoration is sometimes erroneously called the Gilmour. Until recently, little attention has been paid to occlusion as a factor in bridgework, or as a cause of the destruction of the periodontium of the abutments or bridges. Our whole

attention has been focused on the fit of the gold bands which encircle the roots at the gingival margin, or on the nicety of adjustment of the porcelain which was fitted to the ground-off root.

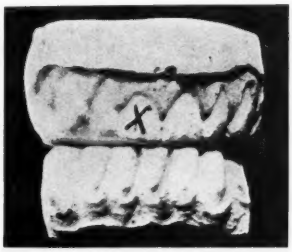


Fig. 18

True, if the gold does encircle the root at the gingival border, it should be fitted so that there is no irritating edge of gold or shoulder of root, and if it is done properly, the gingival tissue or gum will not shrink away and leave the root exposed, notwithstanding the fact that the gum may shrink away from every other tooth in the mouth. This is illustrated in Figs. 18, 19 and 20, the tooth marked *x* in each case being the crowned tooth. But we all have seen very badly fitting crowns acting as the abutments

Fig. 19

of bridges which did not nearly fit the roots of the teeth they were crowning; in fact, they sometimes stand out 1 mm. or more from the root, and the bridge remains solidly in place for years. On examining these cases, we invariably find that there is no traumatic torque or undue leverage. Again let me draw your attention to the fact demonstrated here that the line of force of occlusion should be as nearly as possible at right angles to a straight line connecting the lines of the long axis of the teeth used as abutments.

According to the foregoing, fixed bridgework has very many good points. It also has its shortcomings, the principal one being that it can be constructed so that it is a very dirty appliance, so much filth accumulating under it that the soft tissues become inflamed and are probably a source of infection. We may say that this is due to faulty construction. To get away from this trouble and also to get away from the irritation of the so-called cleansing

Fig. 20

space which to a few people is very irritating, we resort to what we are pleased to call removable bridgework. The designs of removable bridges are many and varied, some answering our purposes very well, and others being not so successful.

After I had been in practice a few years, the benefits and disadvantages of fixed bridgework became evident to me, and in an endeavor to combine the advantages of fixed bridgework, as made evident in the periodontium of many cases, with the advantages of proper mastication through the medium of vulcanite dentures, I conceived the idea of connecting by a bar the teeth in the jaw which remained after most of the teeth had been extracted and using this bar to retain the denture in place. Many

of these appliances were inserted, a few of them doing service at the present time. The bar was constructed of the square platinum posting which was used at that time to make posts for crowns. About 1900 or a little later, this appliance was shown in Buffalo at a convention, at which convention Dr. Fossum had on display an exactly similar appliance which he also was using in his practice. This style of restoration later gave place to what is known as the Gilmour bar and clasp appliance, which is used today to a certain extent.

We must remember that in order for an apparatus of the style of the Gilmour apparatus to be useful, it must be a benefit and not an injury to the teeth to which the bar is attached. If this is done, and it can be done, the Gilmour form of construction is one of the best and longest tried out of any of the removable restorations that have been used. Just lately I have seen a Gilmour in place which has been there for twenty-five years; the teeth to which the bar was attached were the only teeth that remained firm in the mouth. In this case the removable denture did not rest for support on the bar. There was at least ½ mm. to spare, after these years, between the bar and the vulcanite which was the body of the removable part, and as the bar was square, the attachments did not grasp around it as the ordinary attachments on the Gilmour do, but clasped against the two parallel sides of the bar. This method of retaining removable parts of the Gilmour in place will act satisfactorily on the round bar, the sides only of the bar coming in contact with the clasp retaining the piece. In this way we have stability given to the abutments, and no dependence rests on them or on the bar to withstand the force of mastication. The teeth are thereby given very little exercise; therefore, provision should be made, particularly in regard to the molar teeth, for them to get sufficient exercise in mastication by coming in contact with occluding teeth. When properly made, this form of restoration is one of the most successful and one of the simplest I have seen. When not properly made, it is a very unsatisfactory piece of work. Repetition of the fact that it is not wise to have a bar that is not attached at both ends to a tooth will do no harm. We should never neglect to supply healthy exercise for the natural abutments.

There are some other forms of removable bridgework used as restorations (some of those now called removable bridgework formerly would have been called dentures or plates) which in certain cases are successful, but which we know are usually in the wrong place. Removable bridgework which squeezes the gingival tissue up against the tooth, which puts a leverage or torque on the tooth, or which will almost surely cause an abrasion or destruction of the tooth should be avoided. If we decide to use a removable appliance, it must be made to protect the soft tissues as well as the other parts of the periodontium, but the great danger is through its attachment to, and retention by, the abutment teeth, Great care must be taken to avoid torque or leverage on such abutments, and it is nearly impossible to do so if the piece depends partially on the teeth and partially on the soft tissues for support. Such an appliance may be a success at times, but in my experience its life of usefulness is not a long one.

As was mentioned before, there are a great many clever forms of removable and fixed bridgework. I have taken note of the two different departments of fixed bridgework which carries its own occluding surface and depends on the abutments for support, and which is termed, in lieu of a better name, the Gilmour bridge type.

The remedies have only been hinted at, but from some of the statements contained in this paper it is obvious that in dealing with the mouth and teeth we are not dealing with an inanimate

machine which is governed only by the laws of mechanics; on the contrary, the vital factor is always present, and we cannot ignore it. Any kind of apparatus which does not take this fact into consideration will be a failure.

Another fact which a study of this kind brings to our minds is that the teeth are developed to perform their functions and give their best service when there are none of them missing. They need the contact and support of their fellows in health. When through disease or accident some of them have been lost or some of their supporting periodontium has been lost, a good artificial substitute for that lost tissue will very materially prolong their life and usefulness. It is then a matter of judgment of the operator as to which kind of artificial restoration he can use—which in his hands will attain this object with the greatest satisfaction to himself and to his patient.

Discussion

Arthur H. Merritt, New York, New York: There are men, as you know, who have stampeded the profession into the belief that the use of a fixed bridge in the mouth is malpractice. I am persuaded that it is not so much a question of fixed bridgework or removable bridgework as a discrimination as to which is indicated in the particular case, and then proper construction.

Dr. McDonagh makes a distinction between "overload" and "leverage," which I think is correct: it is possible for a tooth to do a certain amount of work provided it is done in a normal manner; what gives trouble is the pressure brought to bear on the abutment teeth that falls outside the long axis of the root. It is a matter of proper construction. A bridge carried from the second molar to the cuspid tooth, for instance, if properly constructed, may give as excellent service as Dr. McDonagh states. Another consideration is the fact that, in overloading teeth, as soon as the pressure is in excess of what the teeth can bear, they indicate that fact by being uncomfortable.

One of the chief criticisms made by the removable bridgework operator is that the fixed bridge cannot be kept clean, or is not kept clean. In answer it may be said that many healthy teeth are not kept clean. But the properly constructed fixed bridge can be kept clean in the mouth of the careful person. I think that Dr. McDonagh sums it up correctly when he says that it is, after all, a question of proper construction; that is the real point. The man who uses removable bridgework and nothing else is as unwise as is the man who limits himself solely to fixed bridgework.

THE RELATION OF THE GENERAL PRACTITIONER OF DENTISTRY TO THE ORTHODONTIST

By R. C. WILLETT, D.M.D., Peoria, Illinois

(Read before the North Suburban Branch of the Chicago Dental Society)

WHILE the character of practice and operations performed by the general practitioner of dentistry and the orthodontist greatly differ, our field of operation is the same. Interests in common necessarily exist, and, at the present time, we have unsolved problems in common, the latter mainly because of a lack of understanding of our joint responsibilities and a knowledge of certain fundamentals that should be common knowledge to both. The fundamentals pertaining to the basis of normal growth and development and those pertaining to cause and effect productive of abnormal development are as essential to the knowledge of the general practitioner as to the orthodontist. The dividing line in the knowledge of the two need only appear in the actual practice of their respective branches of dentistry. The general practitioner of dentistry bears the same relation to the dental specialist as the physician in the practice of medicine does to the surgeon. De Vries[1] makes the comment: "Because the general practitioner of medicine does not happen to be engaged in surgical work, it does not follow that he is exempt from responsibility in a diagnosis of appendicitis! Nor should he minimize the importance of such radical procedure because of his own inaptitude for that particular branch of his calling. In both instances the good of the patient should be the ultimate consideration."

Unless the general practitioner absolutely excludes the child from his practice, he cannot honestly excuse himself from acquiring a certain amount of knowledge common to himself and the orthodontist. If for no other reason, he should acquire that knowledge necessary properly and intelligently to advise parents asking information which they naturally expect a dentist to know. In giving this information he will at least be letting the burden of responsibility for further action rest on the parents' shoulders, and the practitioner cannot be justly accused of not knowing his professional duty.

A comparison of the financial returns from the various lines common to general practice shows that there is little or no direct profit realized by the average dentist in that part of his professional work pertaining to the child patient. It is also a noticeable fact that in most dental schools the subject of orthodontia has been presented to the undergraduate in connection with prosthesis. Because of this close relation as it is taught and the limited time devoted to the subject, it is only natural that the inexperienced practitioner too often considers orthodontia in its practice merely a matter of mechanics, not realizing that the solution of a difficult orthodontic problem does not lie in a patented appliance. This same criticism may be passed on several of the short-course postgraduate schools in orthodontia. It cannot be denied that this has had something to do with the seeming lack of interest in the primary causes of oral deformities which in the majority of cases the general practi-

1. DeVries, B. G.: The Obligations of Dentist and Orthodontist; *Minn. District Dent. J.*

tioner is afforded the first opportunity to recognize and diagnose.

Time will not permit of going into the details of all primary causes resulting in irregularities of the teeth and dentofacial deformities that should be of interest in common to the general practitioner and the orthodontist, but time will allow for certain phases of our common interests to be discussed.

In many cases the conditions we are called on to diagnose are the end-products of causes that became operative long before the eruption of the permanent teeth, and, with few exceptions, are of constitutional origin. It should be more generally known that the degree of success or failure in the treatment of the child patient will depend on whether or not the operative causes, if active, have been brought under control, and to what extent they have limited the possibility of attaining normal occlusion of the teeth.

Let us consider of what the fundamentals might consist that could readily be conceded as a scientific knowledge essential to both practitioner and orthodontist:

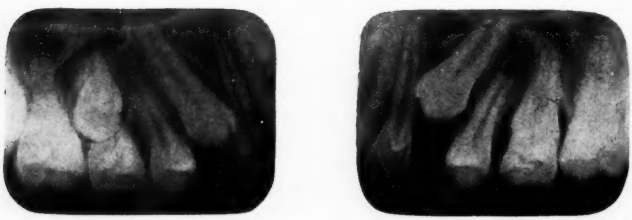
1. Prenatal factors in embryology of normal dentition
   - a. Normal type of parents
   - b. Embryology of tooth development
   - c. Prenatal factors which might result in abnormal dentition
   - d. Type of parents showing glandular or metabolic abnormalties
     1. Pituitary disturbances resulting in pituitary disturbances in offspring with consequent effect on dentition
     2. Thyroid disturbances in mother resulting in similar change in child with consequent effect on dentition
     3. Kidney disturbance in mother resulting in similar change in child with consequent effect on dentition
     4. Nutritional disturbance in mother resulting in disturbed calcium metabolism
     5. Syphilis
     6. Tuberculosis
2. Postnatal normal anatomic and histologic development of tooth structures
3. Nutritional disturbances of infancy and their effect on dentition
4. Infectious diseases of childhood and infancy affecting dentition
   - a. Infected tonsils
   - b. Hypertrophy of tonsils
   - c. Obstructive adenoids
5. Pernicious habits
6. Environment and foods

At what age should we begin treatment? That is almost a timeworn question, and, still, among some orthodontists and some general practitioners, it is material for a heated discussion on the slightest provocation. The problem is one involving all the vital processes and functional activities, local and general, that affect and govern the phenomena of dentition, as well as the effects of heredity which we find it necessary to take into account. When rightly considered, age has very little to do with setting the limits, early or late, for a patient to receive orthodontic treatment. The orthodontist who desires to be very exclusive and ultraconservative may, if he chooses, limit his practice to children of not more than 8, 10, or 12 years of age. But this is misleading to the general practitioner when the practice of orthodontia is considered in its broadest sense. The general practitioner should clearly understand that it is a personal matter with the orthodontist to restrict his practice to patients of a certain age, and that such limits are not based on physiologic reasoning. Johnson[2] says, "We must accept the fact that degrees of development cannot be considered upon the basis of chronological age alone. This means that on account of the inevitable and normal variability of the phenomena

2. Johnson, A. LeRoy: *J. Dent. Res.* Vol. 3, No. 1, March, 1921.

Right Fig. 1 Left

Dec. 18, 1920



Right Fig. 2 Left

April 29, 1921

Right Fig. 3 Left

Nov. 19, 1921

of development a definite epoch of time such as six, seven, or ten years of age does not imply the same conditions in different individuals."

Fig. 4.—Case in which orthodontic treatment materially reduced the aged appearance of the patient: *left,* at the age of 14 years, 4 months; *right,* 16 years, 4 months.

To establish a time as early in life as our service might be permitted with benefit to the child, we could in some cases date it from birth, if all the means were applied that are within the scope of orthodontic science. By observing the course of development of the child's jaws and the eruption of the deciduous teeth, there are many cases in which we could intercept deviations from normal through the maintenance of the functional activities on which a normal course

of development of the jaws is dependent. Later, through the judicious directing in the extraction of the deciduous teeth, their proper exchange for the permanent teeth could be managed, resulting in normal occlusion.

I shall cite here a case from practice which will show how the movement of the teeth can be managed in a certain class of cases without appliances and quite within the range of the general practitioner's service.

Report of Case

In the case of E. F., aged 10 years, 9 months, the maxillary central and lateral incisors were reported to have erupted in normal alinement, but had recently assumed the fan-shaped position shown in Fig. 1. Radiographs were made to determine the cause of the undesirable migration of the lateral incisors. From the radiographs as exhibited in Fig 1, we assumed that the malposition of the lateral incisors was due to the course of eruption of the permanent cuspid teeth. The deciduous cuspids were extracted, and while they ap-

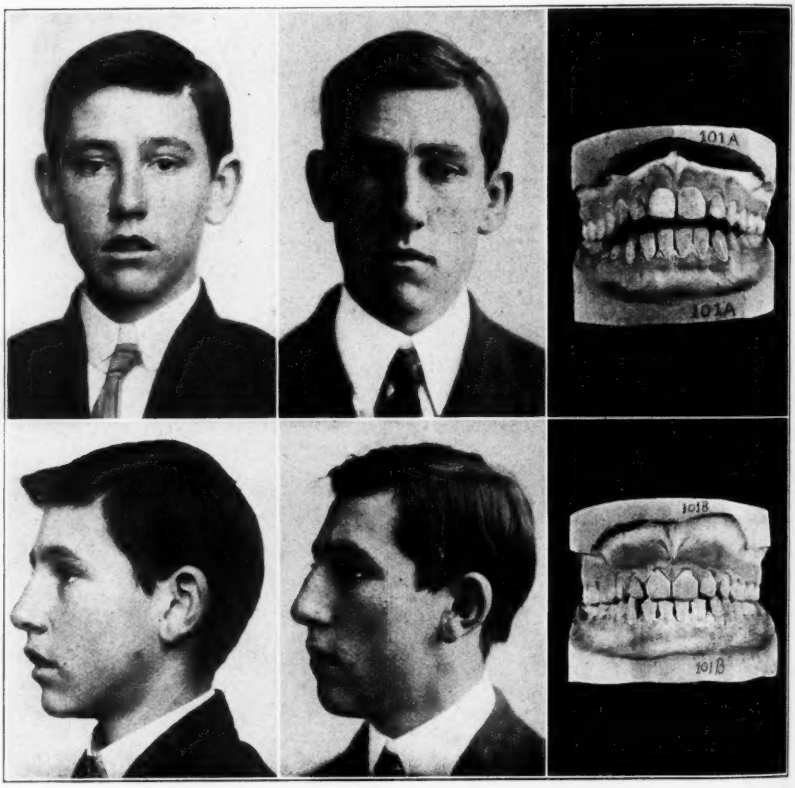


Fig. 5.—Case in which the developing characteristics of the patient were not favorable to facial appearances although permanent results in the occlusion of the teeth were satisfactory: *right*, at the age of 13; *left*, 15.

peared in the radiograph to have little or no attachment, we found them firmly fixed.

April 29, 1921, four months and eleven days from the date of the first visit, the case was reexamined, and radiographs were made, as shown in Fig. 2. At this time there was a noticeable improvement in the position of the lateral incisors.

July 30, 1921, the case was again examined, and it was considered best to apply the theory and practice of Baker[3], so the remaining deciduous teeth in both arches were extracted.

The radiographs in Fig. 3 show the normal eruption of the right cuspid and an improvement in the course of eruption of the left cuspid. Allowing for the approximal space existing between the bicuspid teeth of the left side, we have reason to believe that with the distal migration of the first bicuspid, the cuspid will have ample space in which to assume equally as good a position as the corresponding member on the right side.

If mechanical force had been applied through the use of appliances in the treatment of this case in an effort to reestablish the normal position of the lateral incisors, it would have resulted in nothing more or less than a malposition in the later eruption of the permanent cuspid teeth. This also illustrates the necessity of carefully checking up the movements of the unerupted permanent teeth by a frequent use of the radiograph to determine whether or not dentition is following the normal course of development.

Judging from the marvelous reports heralded to the profession through the current dental literature, the uninitiated might be led to believe that a training and skill in the technical procedure of surveying, in the predetermination of the dental arch, and in the manipulation of an appliance made to sell, like proprietary remedies, are all that are necessary to attain normal occlusion in the treatment of any case. Such an impression is wrong. It is right that the orthodontist should have high ideals and always carry that picture of normal occlusion in mind which represents the

Fig. 6.—Patient, aged 13, hereditary syphilitic; cerebral syndrome with auditory nerve involvement (probably gummas) and an oral deformity (bilateral distocclusion complicated by labioversion of the maxillary incisors): specific therapy with reaction typical in character; result of orthodontic treatment unsatisfactory.

3. Baker, Charles R.: A Consideration of the Exchange of the Deciduous for the Permanent Teeth, *J. N. D. A.* 7:753 (Sept.) 1920.

highest type of functional efficiency and preservation of the teeth, but, considering the deficiencies of the human material we are called on to treat, some noticeable compromises must be made in our work. In every other branch of medical science compromises are made, and neither can orthodontia be practiced in its broadest scope of benefit to humanity unless we frequently make compromises with our ideal in the treatment of many cases.

The accompanying illustrations show the variability of the physical qualities of different persons and how those inherent qualities developed in the course of treatment and influenced the final results. As an evidence of the development of superior physical and mental qualities, you will please notice what has happened in the case illustrated in Fig. 4. Here the latent good qualities came to view in the course of treatment. All that could be hoped for was developed. In the case shown in Fig. 5, the reverse of conditions took place in

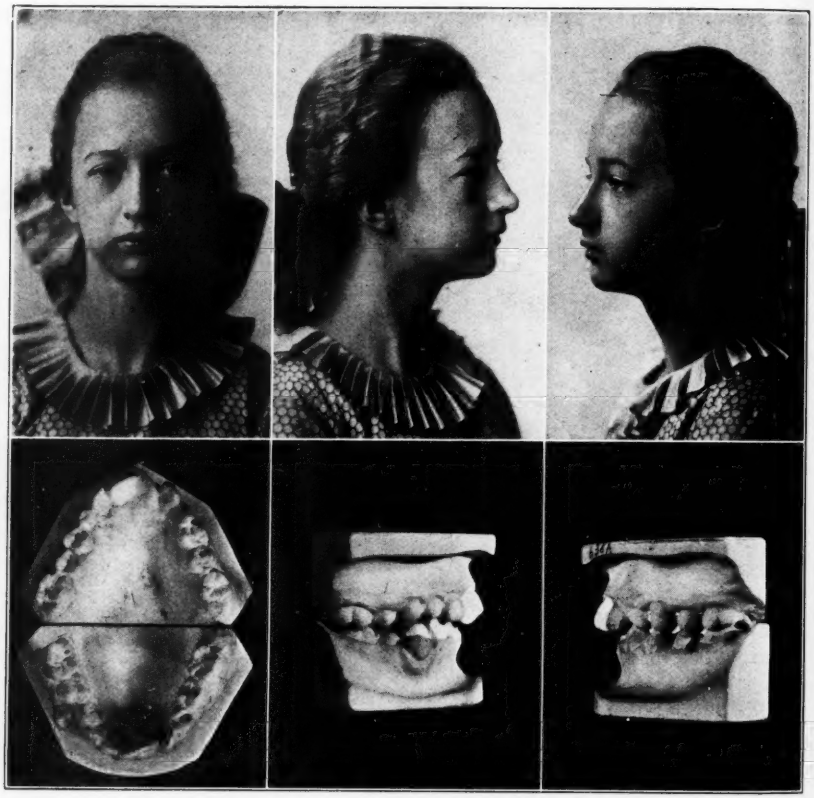


Fig. 7.—Dentofacial deformity due to caries of the deciduous teeth and their premature loss, in patient aged 11 years, 9 months (June, 1920).

the natural course of growth and development. The natural characteristics of the persons predominated in both cases according to their respective intellectual and physical norms. Figure 6 illustrates another case in which physical conditions due to syphilis of an hereditary type and other complications precluded all possibility of a satisfactory orthodontic treatment.

Muscular Development

In the service of the general practitioner and the orthodontist to the child patient there are three very important factors relating to the development and maintenance of normal occlusion of the teeth that should be kept in mind: (1) normal retention of the deciduous teeth throughout their period of usefulness; (2) the effect of normal functional use of the teeth on muscular development, and (3) the effect of efficient muscular development on normal anatomic form of the bones of the face, dental arches, and position of the mandible.

Figure 7 illustrates the effect of a premature loss of the deciduous molars on the right side, the effect being an unequal exercise of the muscular forces, resulting in a varied development of the bones of the face and jaw. Figure 8, the radiograph in connection with this case, exhibits one of those cases of root absorption of a lateral incisor evidently resulting from the perverted course in the eruption of the cuspid tooth.

There are a number of factors commonly designated as holding the mandible in place. Of those factors, the muscles seem to be the most important and constitute the dominant force in determining its position; hence, they should be uniformly developed to maintain the correct mesiodistal relation of the maxillary and mandibular arches in the normal occlusion of the teeth.

Figures 9 and 10 show dentofacial deformities in which there is an involvement of the temporomandibular articulation. In neither of these cases was there any evidence of obstructions of the respiratory tract common to the nose and throat, and no past history that would indicate obstructive adenoids or hypertrophied tonsils as factors in contributing to such deformities. While appliances are essential in the treatment of such cases, the important phase of the treatment on which all permanent benefits depend in the final maintenance of occlusion is in the training and development of the facial muscles as well as those of the neck. These patients were instructed in the exercise of the various muscles, as suggested by Rogers[4].

Fig. 8.—Radiograph of case in Fig. 7, showing root of maxillary right lateral incisor absorbed, evidently resulting from course of eruption of the cuspid tooth.

Complications in Practice

Some people are a little skeptical about stepping out of the beaten path and accepting the services of a specialist. It frequently happens that patients will go from one dentist to another, for one reason or another, trying to avoid the orthodontist, and each time a dentist is consulted, the service of an orthodontist is recommended.

In time the patient comes to the orthodontist—possibly to the one most often recommended—and it is not always that an acknowledgment of reference from

4. Rogers, Alfred Paul: Muscle Training and its Relation to Orthodontia, *Internat. J. Ortho.* Vol. 4, November, 1918.

each of several dentists can be secured at the time of the consultation. In my own practice I have frequently discovered as many as three dentists referring a single patient, and I promptly sent my acknowledgment to the three. In the course of a year I found that others had kindly recommended my services in the case. The question arises, "To whom can this patient be justly advised to return for other dental service?" While the orthodontist is grateful to all for the confidence expressed in him by the several practitioners, he is left in an undesirable position. People have a habit of changing dentists, and for no plausible reason. I have known a family to patronize as many as five different dentists during a period of eighteen months in which one member of the family was receiving orthodontic treatment. The instances cited are productive of much professional jealousy over which the specialist has no control, and such situations can be managed only by an abundance of common sense, a knowl-

Fig. 9.—*Left,* patient at age of 14 years, 7 months; *center,* 15 years, 7 months; *right,* 17 years, 7 months.

edge of human nature, and liberality on the part of the general practitioner and orthodontist.

Misunderstandings between the specialist and the general practitioner may arise through oral communications entrusted to the patient or the parents. All messages pertaining to the service in the referring of a patient or the treatment of a case should be in writing and carbon copies filed with other matters pertaining to the case record, or at least filed where available if wanted for future reference.

While we may telephone our acknowledgment of the arrival of a referred patient, or express our appreciation in person, the more acceptable way is to write that acknowledgment, and, if an examination of the case has been made, state something definite in that message relative to the diagnosis and prognosis of the case. By way of such letters, a thorough discussion of the fundamentals of diagnosis is frequently brought about with the general practitioner, which will go a long way toward establishing a common-ground knowledge essential to both.

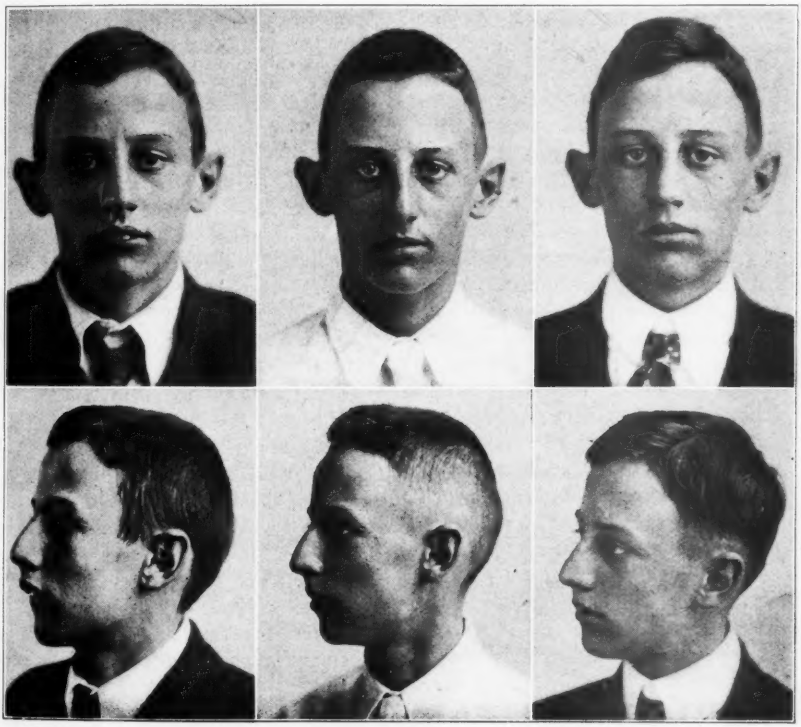


Fig. 10.—Mandible in retroversion; treatment consisted of increasing the lateral width and shifting the relation of the jaws to normal, depending on maintenance through a better development of the controlling ligaments and muscular forces: *left,* patient at age of 12 years, 6 months (November, 1915); *center,* 13 years, 2 months (July, 1916); *right,* 13 years, 9 months (February, 1917).

THE PROBLEM OF THE PATIENT

By FREDERICK B. MOOREHEAD, M.D., D.D.S., Chicago, Illinois

(An informal lecture delivered before The Chicago Dental Society)

HUGH T. Patrick, about a year ago, read a paper before the Institute of Medicine on "The Patient Himself." The discussion in Dr. Patrick's paper is most unique from the standpoint of subject-matter. It is a curious thing after all that it should ever become necessary to discuss in a formal way the patient himself; it would seem that the basis of all medical practice would involve a serious consideration of the man and all his interests.

It is rather astonishing that the medical man seems at times to consider everything but the patient. True enough, the patient is in the background always, but too often he receives attention which is more or less indirect. The mechanism of routine is all-absorbing, and in the course of modern medicine, we have evolved a machine which runs more or less automatically and grinds a grist year in and year out without respect to personal equation or individuality. There is a serious danger of one losing freshness in routine.

To evaluate human life is difficult, if not impossible. The economist has for several years been trying to arrive at some sort of standard of evaluation by which human life may be calculated in concrete terms. It will probably never be possible to make any final definition of human values even on an economic basis. The human machine is abstractly one thing, and concretely quite another.

Recently, President Wilbur of Leland Stanford University has collected some rather interesting figures, most of which may be found in the United States Public Health Report. I want for a moment to use some of these figures to illustrate economic values and economic waste. The economic loss every year from death in this country has been estimated at $1,700,000,000. Before the World War, our national debt was $1,000,000,000 which we considered very large, and yet we had an economic loss in this country from sickness of five or six times the size of our national debt before 1917. It goes without saying that much, if not most, of this economic loss may be prevented. Five hundred thousand people die every year from communicable diseases; 5,000,000 people are incapacitated every year from infectious diseases; 154,000 die every year from tuberculosis; 132,000 from pneumonia, and 150,000 from acute infectious diseases, largely the diseases of childhood. It is estimated that over 500,000 people are infected with syphilis, and when one takes into account the sequelae of syphilis, the figures are staggering. The burden from this disease alone is very large. Three hundred thousand people die from kidney and heart disease; 80,000 from cancer. According to the health report, 2,000,000 people, men and women, suffer from gonorrhea. Strangely enough, we are more or less inured to the problem of

the sick and disabled. We do not seem to be concerned with the fact that there are 500,000 people who suffer from syphilis, and 2,000,000 from gonorrhea in our country. The tragedy of life after a while seems to become commonplace, and we can no longer see the tragedy of sickness and death. When disease and death come into our homes and strike at our family or friends, they then become very personal. Ordinarily we regard them in a commonplace, impersonal way. It does not seem to concern us particularly that 500,000 people die every year in the United States; that we have all the time 5,000,000 people suffering from tuberculosis.

President Wilbur states that "only 40 per cent of our people are gainfully employed; the other 60 per cent being made up of the wives, children, aged, the sick, criminal, insane, and the worthless; in other words, 40 per cent support 60 per cent". In the very nature of wisdom these things ought not to be so. Beyond the question of cold economics, the mental and physical distress of it all is beyond human computation, for nobody can measure the indirect burden of sickness and death. Many a man, because of physical and mental burdens, is potentially dead while walking about. Many a man has been incapacitated, in a large measure, by the forces of life which spoil life for him. Four hundred and sixty out of every thousand men examined for military service in the United States were rejected because of defects. In other words, 46 per cent of our young men were unable to meet the challenge of the World War, and when it is estimated that this breakdown occurred in the military period, which should represent the finest in physical vigor and development, it becomes all the more tragic. The group which I have been talking about will supply the fathers and mothers of the generation that is to follow this. While the reproductive function is impaired by disease, the fact remains that possibly the majority of them retain that function and exercise it without restraint.

Unfortunately, the attitude of the physician is too often related to the routine and machinery of practice rather than to the patient as an individual with individual needs. Too often the physician, or the dentist, thinks in terms of laboratory detail, and loses the broader conception of physical and mental values. A very pregnant illustration of this fact occurred when I was a student at Rush Medical College taking a course in laboratory diagnosis conducted by James B. Herrick. At the close of the quarter Dr. Herrick discussed briefly the laboratory in relation to clinical medicine, reviewing the various means of obtaining information through the laboratory, and the value of this information to the whole problem. He closed his discussion with this statement: "But gentlemen, don't forget once in a while to look at your patient". It impressed me at the time and has continued to impress me during the intervening years, and I think it might well be adopted as a doctrine in modern medicine—"Don't forget to look at your patient".

Now about the dentist; he is apt to think in terms of teeth rather than in terms of health and physical comfort and economic value. How often is the dentist primarily concerned with the physical well-being, physical comfort and usefulness of his patient? How often does he recognize that he is treating his patient in a larger sense than he is treating his patient's teeth?

The attitude of present-day dentistry has a twofold traditional source: (1), the dental practitioner, and (2) the den-

tal school. The tooth to the dentist has become a fetish, and any fetish is below the level of the man who worships it, for finally fetish worship descends into false ideas and false ideals.

The separation of dentistry from medicine was most unfortunate, and is responsible for the conflicting attitude today of the physician and dentist. The student coming to the school of dentistry has already caught the attitude of mind of the dental profession. The prospective student makes his decision to study dentistry very largely through the influence of some dentist or group of dentists. From his dental associations he gets a certain attitude of mind, and when he enters the school of dentistry, the chances are that that attitude will be maintained, and he, in turn, will carry on the dental traditions.

It seems at times futile to bring into the functions of dental education the conception of physical values: that the tooth is after all a part of the body, and that through the blood and lymph streams it is a vital part of the composite whole. The dentist has, figuratively speaking, taken the mouth out of the body, and by that I mean he has come to believe that anything may be done with the teeth without involving the patient's physical interests. It must be apparent, then, to the thinking mind, that the first great problem of the patient is an economic one, and the second problem, I should say, is the attitude of the physician and dentist toward the patient's needs; here the crux of the whole question is solved in the difference between the routinist and the one who is humanly concerned with the problem of the individual. In other words, the curse of routine is one of the great problems of the patient

The problem of the patient is further illustrated in the relation between the general practitioner and the one following a special line of practice. The general practitioner refers a patient, for example, to an extracting specialist, with instructions to remove teeth. The question at once arises, Shall the specialist have an opinion or not? Or, is he merely an instrument to be used by the general practitioner? In medicine, as a matter of fact, the general practitioner calls on the specialist for expert opinion, and the presumption is that the specialist is more fully qualified to render an opinon in highly specialized functions than the general practitioner. It is hardly conceivable that an extracting specialist is willing to extract teeth regardless of his own opinion in the premises, merely because he has been requested to do so by some dentist. The outstanding virtue in any particularized field is the power of interpretation—diagnosis. It would seem reasonable, therefore, to presume that the extracting specialist was more or less expert in the determination of conditions which require the removal of teeth; the teeth should not be removed without fundamental reasons.

The patient is again confronted with the problem in the matter of finer values in terms of porcelain inlays and porcelain jacket crowns, etc. We have a group of men who are highly skillful in the manipulation of porcelain, particularly the jacket crown, and it is after all a nice question whether a tooth should be cut down and an inferior post crown adjusted, or whether that patient should be given the benefit of a finer piece of dentistry in the form of a jacket crown.

We all see growing boys and girls with the incisal edge of an upper incisor broken through accident. A skillful technician may repair such defects with great satisfaction to himself and

patient. Shall the patient be given the benefit of such superior skill, or shall he be subjected to a gold foil or gold inlay or crown?

The removable bridge brings up another problem. There are undoubtedly a limited number of indications for removable bridgework, but in my opinion, they are limited. Moreover, the removable bridge must be made by one technically expert. A very similar situation arises in relation to dentures. We have among us men who are expert in the construction of dentures. Most men are not. Shall the patient have the benefit of the expert and be restored to comfort, or shall he go on with an inferior denture?

The subject of orthodontia, perhaps, is still a greater problem than any of the above, and one that requires more than passing discussion. Suffice it to say that only one expertly trained has any moral right to undertake the correction of irregularities.

Another phase of the problem of the patient is illustrated in extreme forms of practice. On one hand, the dentist insists on removable bridges exclusively; on the other, the dentist uses only fixed bridgework.

Among the extreme forms of practice, there is one which is really more serious than all the others combined, and that is the so-called surgical removal of teeth. Just why the word "surgical" has been hit upon, I do not quite understand, as quite naturally enough, the removal of any tooth is a surgical procedure; surgical principles should govern the removal of all teeth. There is at present a more or less widespread practice of opening the gum tissue and chiseling away a part of the alveolar wall for the purpose of removing a tooth. The practice is thoroughly pernicious, because it violates the basic principle of all surgery, namely, that operations should be conducted with the least possible injury to the tissue. The true surgeon has respect for tissue, and will never abuse it. Apart from the matter of unnecessary injury, one must think of excessive scar tissue resulting from this form of practice, and also the increased danger incurred in the unnecessary opening of blood and lymph vessels where there is infection at the root end, or one involving the membrane. One sometimes wonders whether there is a difference between the simple, ordinary removal of a tooth for a fee of $5.00, or the so-called surgical removal of a tooth in the hospital for a fee of $100 or more.

Another extreme form of practice which has sprung up within recent years is the removal of all teeth with nonvital pulps. The principle underlying the removal of a tooth is relatively simple. No tooth should ever be removed so long as it is of greater service to a patient than an artificial substitute. To be of fundamental service, however, the tooth must be (1) comfortable; (2) free from all danger, particularly infection, and (3) serve its natural function. The removal of a pulp does not of itself destroy the usefulness, comfort or safety of a tooth, if intelligently performed. Unless there is demonstrable evidence that the tooth is involved in infection, or is producing discomfort, or is by virtue of its position interfering with some prosthetic appliance, it should not be removed.

The problem of the patient is further illustrated in relation to the reactionary dentist, who ignores all forms of infection and refers the whole matter as a passing craze. Here we have the two extremes—the dentist who insists on the removal of a tooth merely because the pulp has been removed, and the dentist who refuses utterly to remove any teeth regardless of the extent of infection; the

patient is caught between the upper and nether millstones.

One of the more serious problems is that of poverty. What has dentistry done for the poor? Has dentistry developed a true civic spirit through its organization for the care of the socially dependent? I think we agree that it has not. The reason is illuminating: It is largely because dentistry with most of us is a business and not a profession, and just so long as dentistry remains a business, the poor patient is going to suffer. There is a vast difference between practicing dentistry as a profession, and practicing it as a business. As a matter of fact, the crux of the problem of the patient lies in the interval between the business and the profession. As a social function, dentistry cannot be considered a very great success. We have not discharged our full obligation to the poor.

Let me speak for a moment about the greatest problem of all—and that is the problem of the child. We have not developed a sane and sensible human program for the child. We have many illustrations of emotion and sentimentalism about the child and children's dentistry. The time is coming, and I hope not far distant, when we shall have clinics for children in all our cities, and in rural districts as well—clinics for the whole child, the mind as well as the body. It is more than unbelievable that a state or nation should neglect its children. Viewed in commercial terms, there is nothing so uneconomical as the neglect of childhood. In arranging for the care of the child, his every need must be taken into account. Recently some effort has been made, through the Pageant of Progress, to raise funds for a children's dental clinic, and I sincerely hope that the thing will never develop. We do not need a children's dental clinic in the city of Chicago. It is uneconomical, it is unscientific, it is unsatisfactory, viewed from any angle. What we do need in the city of Chicago, and in all other cities, is clinics for children which will be equipped with a dental division where the whole child may be cared for—not the mouth of the child in forgetfulness of the child's whole physical interests. The problem of the child's mouth is at once the problem of the child's physical economy. The mouth cannot be looked upon as a separate problem, and never can be handled as a separate problem. Why, then, should we build up a mouth clinic? Obviously, the outstanding problem of childhood is that of feeding. To be sure, there are deformities, and other infections, but the big thing after all is the question of food. In a well-ordered children's clinic, the whole child will receive attention—not only physically, but mentally. We do not need separate clinics for tonsils, teeth, feeding, mental defects, stutterers, etc., but we do need clinics for the whole child.

Is there any argument at all why these needs should not be met in one well-ordered organization; where the men concerned are working in a cooperative way; where they see the problem of the other phases of medicine; and where all get an appreciation of the whole body? Moreover, in these children's clinics there is another function as great almost as that of the child himself—the mother. And in this respect a prenatal clinic is of greatest value. The average mother in the poorer walks of life needs instruction about the care of herself and her attitude toward the child that is to be; then the care of the newborn, and, later, the child with his various problems. All of these should be the function of the children's clinic, and it seems almost mischievous to break into this program with isolated clinics.

Dentistry is not teeth. Dentistry is that function which undertakes to safeguard the mouth from harm, which removes and prevents diseases involving the mouth and its tissues. All this it does as safely and as quickly as may be possible, keeping in mind all of the time the patient more than the teeth.

Perhaps you have caught what I mean by "the problem of the patient". I do not want to take the position of indicting anybody. I have tried to discuss this question in the abstract, and to look upon it purely in its academic form. Curiously enough, we seem to forget that while we are following our fads, good or bad, honest or dishonest, as they may be, the patient is all the while the innocent bystander; he is caught between the upper and nether millstones. After all, the problem of the patient is the largest and best problem of the practitioner, be he dentist or physician.

Discussion

C. N. Johnson, Chicago, Illinois: The psychology of the patient has been played upon by members of our profession to an extent that is almost a disgrace. I am going to give you an illustration of what I mean. Many people are made ill by mental impressions. There is no question about that. Every practicing physician knows it, and every dentist knows it. In recent years since the matter of focal infection has been so prominent, I have been frequently impressed with the imposition on the patient in this particular regard. The patient becomes ill, goes to the physician and, in the routine of examination—and by the way Dr. Moorehead emphasized, but not too much, that the practice of medicine and that of dentistry are made too routine entirely—the patient is sent to a radiographer for a picture of his teeth. Now there is a great deal of psychology in this particular thing. The men in the beginning who made radiograms were in the habit of saying to the patient, "You have an infection at the end of the root of that tooth; you have an abscess there." That term "infection" and that term "abscess", in the first place, were impositions because no man in this room or in any other room can tell by a radiogram whether there is an infection or whether there is an abscess there. It is a criminal wrong to say that to the patient. When you are not sure it is there, you have no right to say to the patient that it is there, and from a psychologic aspect it is wrong because most people know that an infection is serious and that an abscess is a menace. If you tell the average patient that he has an abscess or an infection at the root of the tooth, he is going to be ill whether he was ill before or not, and he is not comfortable until that tooth is taken out of his mouth. Now if it were possible to demonstrate an abscess or an infection, that abscess or infection should be cured or the tooth removed, but I believe, as Dr. Moorehead does, that all pulpless teeth do not have to be removed. I know from a long clinical experience that many teeth that have had abscesses have been cured and made useful for many years without any menace to the patient. Therefore, I say it is wrong to tell the patient he has an abscess or an infection. I have heard that so often.

A little tot of a girl was in my office the other day. I had sent her for extraction, and the mother said to me, "Why, Doctor, do you know there were pus pockets at the end of each one of those five teeth!" They have got to make an impression on the patient that that operation was so very necessary, and they try to make it a very formidable procedure.

I was glad to hear Dr. Moorehead say what he did about the surgical removal of teeth. Again the problem of the patient. You or I have no right to implant in the mind of a patient a terrifying idea unless we know we are right. Many a good, serviceable, normal tooth has been sacrificed on account of implanting in the mind of the patient the impression that there was an infection there. I have sympathized with the patient in that matter of psychology because when the patient is told that he has an infection he cannot feel comfortable afterward even when there is no infection there. There are many people of that type.

I had the pleasure last winter of reading a paper before the Academy of Medicine in New York and before the First District Dental Society, and there were many medical men there. I took up the question of psychology in that relation—and that is not the only relation in which psychology impresses me very forcibly. Many of these health articles that are published in the public press have done more harm than good. I will tell you why. I believe in teaching people how to live

hygienically. I agree that we need all of that kind of instruction that we can get, and articles of that sort are most commendable, but when a man describes the symptoms of disease in the public press it is bad. To keep harping on symptoms is nearly as bad as have been some of the patent medicine advertisements which describe symptoms. When our good friends the medical men write articles, I say, let them write articles to teach people how to live, having in mind all the time the problem of the patient. That is a normal kind of instruction; but when they proceed to tell people how they feel when they have a certain disease, they are implanting in the minds of the people things that should never be there. That is what made patent medicine so profitable in the past, and it will continue to be profitable until the people are educated. I commend most highly those newspapers that have excluded patent medicine advertisements from their columns.

Another thing that Dr. Moorehead brought out was the matter of routine practice. In routine practice we forget a fundamental fact—that there is a difference in the physical makeup and constitution of different patients, and the dentist who treats patients in a routine way is not doing full justice to the patient.

The general practitioner is under deep obligation to the specialist. We send our patients to the specialist because there is a certain class of service called for that we are not competent to perform properly. I myself feel greatly indebted to the specialist for relieving me of many burdens, and for taking from my shoulders much responsibility, and for serving my patients better in that particular than I can serve them. I feel that the specialist has done a great deal of good. The specialist has developed his particular science to a higher degree than the general practitioner can do. But many abuses have crept in due to specialism in practice. The specialist cannot be blamed for all of these. He is sometimes placed in a difficult position. The average man who extracts teeth could not well act on the suggestion regarding an expression of opinion by the specialist as to whether a tooth should be extracted. He will not retain the respect or support of the general practitioner if he does not do as requested. I want to tell you that the specialist is up against it. He will tell you the same thing because he knows it only too well. As a matter of fact, we need specialists, but there is one thing about the practice of a specialty, and every honest specialist will acknowledge it—it tends to make men narrow-minded, and narrow-mindedness is the bane of our existence. It is difficult to look over the whole field of our operations and to see the point of view of the patient, and the point of view of the practitioner. The specialist is human, and in concentrating on one idea he is very prone to make his specialty the one important thing in the practice of his profession. In that way, perhaps, the specialist has been led to mistakes. He has been induced in certain instances honestly and conscientiously to practice the surgical removal of teeth. I hope he will reform after tonight. I believe that any specialist who is here and who has been doing that after hearing Dr. Moorehead's arraignment on the subject will stop and think.

I do not need to tell you that it has been a very serious thing, and, as he said, the patient has been the one to suffer, and the physical and mental suffering has not been the only suffering. Some patients who could not afford to pay so much have suffered financially. A lady said to me today in reference to a friend of hers, "You know, Doctor, I have a friend who had some trouble with a tooth and had to have it extracted, and do you know, that tooth was in such a condition that it could not be extracted, but had to be surgically removed." God save the mark! The exploitation of the patient has been the worst thing that has come into our profession because it is demoralizing in every way, and has done more to undermine the integrity of dentists and bring reflection on the profession than anything that has ever occurred.

Let me refer to Dr. Moorehead's quotation of Dr. Herrick's saying: "Don't forget to look at the patient". In the last few years, as I have stood at my chair and seen patient after patient, and listened to the remarks made to them by other dentists, I have an overwhelming compassion for them, because they have been told things not for their interest or welfare, but for their exploitation. There is nothing more pernicious in all human relationship than that, and we must have a regeneration in our profession, and get back again to the practice of the Golden Rule. In other words, we must treat patients as we would wish to be treated if we were the patient and the patient was the operator.

F. B. Noyes, Chicago, Illinois: In the office of a practitioner I once heard a lady say as she turned to the operator, "Doctor

I have come to you for all these years because you never forget that I am a human being." That was a recognition, as I take it, of the phase that Dr. Moorehead has presented. She came to him because he remembered that she was the patient. I have seen and have been pretty closely related to some men who were very active and very prominent in the profession for a long time, and as I grew up in the profession it seemed to me that I saw this thing—a group of men, high-minded and capable professional men, whose concern was the well-being of the patient; who had come into practice through obstacles and obtained their training with difficulty, or perhaps had received little training; whose technical skill in some instances was not very great, but who always kept in mind the good of the patient. I saw young men, trained in ways the older men had never had the advantage of, who criticized the technical skill of their elders and discounted them professionally. In many, many instances, although the young man's operation was infinitely better technically, it was infinitely worse for the patient. Now we must clear our conception on some of these points. We have to remember that a certain procedure is not measured by its beauty, by its esthetic value alone, or by the perfectness of its mechanical execution and the beauty of its construction; it is measured finally by its usefulness to the person for whom it is made. What we need to have fundamentally is the ability to widen the outlook. It is hard for us sometimes to realize that every phase of training that a man has gone through widens his outlook and increases his assets for application to the good of his patient if he holds uppermost always the good of the patient. Some men regard the public as existing for the good of the profession; other men regard the profession as existing for the good of the public. There you have the fundamental problem. There you have the summing up of the whole subject.

It is just as true in one field as in another, in dentistry, the coal industry or railroad operation: whether the public exists for the good of the railroad or the railroad exists for the good of the public; is coal to be mined for the warmth of the people and to serve the commerce and industry of the country, or is it mined merely for the good of the miners; does the dentist exist for the good of the public or does the public exist for the good of the dental profession?

P. G. Puterbaugh, Chicago, Illinois: Dentistry faces two problems at the present time: one that deals with infectious conditions which may, if neglected, seriously affect the health of the patient and where financial remuneration for services should not influence the mode of treatment; and one of a mechanical restorative nature involving financial outlay for precious metals and the consumption of valuable time, in the performance of which the question of infections is not directly involved, the quality of which may be legitimately adjusted in accordance with the patient's financial ability to pay.

In dealing with oral infections from a pecuniary point of view, the dental surgeon places himself alongside the conscienceless general surgeon who has allowed his judgment to be influenced in favor of an operation by the anticipation of a large fee.

Let us return to our offices with renewed determination to study the "problem of the patient" as we have never studied it before.

DENTISTRY—A SCIENCE OR AN ART?

By R. G. KEYWORTH, D.D.S., St. Paul, Minnesota

(Read before the Monson Research and Clinic Club, St. Paul, Minnesota, May 15, 1923)

IN presenting this paper for your consideration, my only object is to raise sufficient question in your mind regarding the present status and position of dentistry in the scheme of things more effectually to crystallize our thought and systematize our methods of research and the presenting of the results of this research to our profession. It is an attempt to analyze the relation of dentistry to the arts and science.

Is dentistry a science or an art? If an art, to which does it belong—the mechanical or the esthetic art?

Science has been defined as knowledge gained by exact observation and correct thinking. However, knowledge of a single fact not known as related to any other, or of many facts not known as having any mutual relations or as comprehended under any general law, does not reach the meaning of science: science is knowledge reduced to law and embodied in system. The knowledge of various countries gathered by an observant traveler may be a heterogeneous medley of facts which gain real value only when coordinated and arranged by the man of science.

Art always relates to something to be done; science to something to be known. Not only must art be discriminated from science, but art in the industrial or mechanical sense must be distinguished from art in the esthetic sense: the former aims chiefly at utility; the latter, at beauty. Science does not, like the mechanical arts, make production its direct aim, yet productive application in the arts is a constant stimulus to scientific investigation; the science, as in the case of chemistry or electricity, is urged on to higher development by the demands of the art, while the art is perfected by the advance of the science. Creative art seeking beauty for its own sake is closely akin to pure science seeking knowledge for its own sake.

I believe that I am justified in the assumption that our profession is a combination of science and art, both mechanical and esthetic. However, it would seem that the mechanical art far overshadows the science and esthetic art. Being a group of average individuals and on the whole ordinarily human, we are more strongly attracted by the material rewards of the mechanical arts than by the mental or spiritual stimulation induced by pure science. Man does not yet seem to be far enough removed from his primeval ancestors to have overcome the physical instincts to such a degree as to give mental activities the predominance in his subconscious reactions. And in like manner we, as dentists, being no further developed in the scale of evolution than our fellow men, are prone to emphasize, in our research work, production rather than the knowledge of fundamental principles. We seem desirous of the increased physical rewards resulting from production rather than willing thoroughly to ground ourselves in the necessary fundamentals. The instinct of self-preservation is the first instinct of mankind, and is always the guiding factor in the routine of our

everyday life, except where there is a conscious effort of the will in another direction. Without this conscious effort being present in a research group such as ours, we will soon be bending our efforts to the development of mechanical ingenuity and digital dexterity rather than the scientific knowledge of the fundamental principles and biologic problems which are the groundwork of our real service to mankind and our profession.

Dr. Charles H. Mayo made the statement that dentistry has progressed more in the last ten years than medicine has in the last half century, and possibly this is true. In fact, an analysis of the situation would make it seem quite probable. Dentistry has been, since its beginning, to a great degree mechanical, and, as one historian has said, this is the mechanical age. Although we may feel justly proud of the compliment to our profession by this great surgeon, we cannot, in all fairness, look upon ourselves as a group of superior beings, overshadowing our medical colleagues. Our development along the lines of mechanics has taken place wholly within the dental profession and certain trades allied thereto, and is not phenomenal in comparison with the same progress in other lines of endeavor. Our knowledge of biologic fundamentals, with a few exceptions, has been taken from medical investigators, and applies to our own particular field of endeavor only in those cases where their work overlaps ours. Thus we see that the general tendency of our profession is toward the development of the mechanical arts rather than science.

The constitution of this research club states that its purpose is to attempt the solution of the problems involved in the restoration of function lost by reason of any deformity or breaking down of the dental mechanism, the organization of this knowledge and information and the ethical dissemination of same, and the general promotion of the scientific study and research of dental subjects.

This group, in attempting to fulfill its stated purpose, is dedicated to science and scientific teaching. We hope to solve some of the fundamental problems in dentistry; we hope to interest other members of our profession in these problems and obtain their assistance; we hope intelligibly and scientifically to present our findings to our colleagues in such a manner that these findings shall be of real and lasting value; and also we hope to do honor to the name of the man who has furnished the scientific information and intellectual stimulus that has made this club possible.

Such a program as this will mean sacrifices on the part of every member of this body. Scientific knowledge is not obtained in the seeking of personal gain. The ancient alchemists experimented for centuries with chemical reactions in an attempt to produce gold from baser metals and added not one iota to the science of chemistry, while, since chemists have sought knowledge for its own sake, chemistry has been raised to the position of one of the most advanced sciences of the present day. We must have men of the research type in this organization; men who are willing to sacrifice time and conduct investigation for the knowledge obtained and for that alone; men who can conduct an experiment in a scientific manner and not be carried away by their enthusiasm for some particular hypothesis. An experiment is the act of asking Nature a question and arranging circumstances so that Nature can give the correct answer—not necessarily the answer that best fits our own supposition. It is my opinion that in this way alone can we hope to discover scientific truths and knowledge of fundamentals that will be of sufficient value to endure the changes in mechanical contrivances that are ever shifting through the generations of dentistry.

We also must have men who are capable of assimilating the knowledge of the researchers and presenting it to the profession at large, men of the clinician type. Even though we partially

overcome our own instinct of material aggrandizement and dwell in the heights with the scientific intellectuals, if we fail to present our findings in such a way as to appeal to the largest number of our profession, we have failed in our purpose. Observation will show that gynecology and obstetrics, in medical clinics, and denture and crown and bridge technic, in dental clinics, attract the largest audiences. Here, again, we have an expression of that basic instinct, self-preservation. These subjects might be termed the bread and butter subjects in their respective fields, as they have the most direct bearing on the individual's material gain in everyday routine. It seems, therefore, necessary to link up our fundamental principles and scientific conclusions, after they have been proved as such, with some technic, as a vehicle to carry our message, rather than as an end objective. This productive application of our findings to technic by the clinicians would also prove to be a constant stimulus to the scientific investigators. By carrying ourselves gradually into a consideration of the purely fundamental problems rather than the mechanical phases of our work, we may hope to induce better appreciation of these fundamentals among the profession at large. We cannot progress by revolutionary methods. The problem before this group at the present time is a more complete changing from art to science, and must be brought about by a progressive evolution. In fact, real progress in this, as well as any other human endeavor, is a matter of evolution, and consists of a number of related things changing together for the better. We must not precipitate one improvement into a situation that would nullify the improvement. No change comes alone. People are going ahead on this line or that, breaking their hearts because the special change they desire does not come to pass, not realizing that many times, if it did come about immediately, it would die from lack of harmonious conditions, as a seed planted out of season. Progress is a new season, and the rule of progress is everything in its season.

In the past three years, a more or less passive change has been taking place in the dental profession. There is coming about a gradual appreciation of the scientific side of dentistry, with a relatively corresponding depreciation of the importance of the purely mechanical phase. Recent dental convention programs show that scientific subjects are more and more coming to occupy the same status of prominence as technical operations. Can we who have dedicated ourselves to this science develop our findings and sow our seeds of scientific fact upon this field of gradually increasing fertility before it becomes rank with the weeds of theory and commercial propaganda?

The Monson Research and Clinic Club has an avowed purpose, and on the fulfillment of that purpose depends its life. By perfecting standardized and attractive technic we can produce a group of popular clinicians, but that popularity will not endure. By developing the fundamental principles of reconstruction learned by conscientious research and dressing them in the finest of technic to make them appreciable to the largest number of dentists we can make these principles live on through the ages of dentistry.

THE COLORING OF DENTAL PORCELAINS

By K. K. CROSS, D.D.S., Denver, Colorado

(Read before the National Society of Denture Prosthetists, Los Angeles, California, July, 1922)

ALMOST without exception, the study of the coloring of dental porcelains has been confined to the research departments of tooth manufacturers and ceramists engaged primarily in partial restorations, porcelain inlays and overlays such as jacket crowns. Manufacturers, from the point of view of good business, may let the *basis* of their experimentation become known, yet the profession is informed only of results, which it must judge for itself as to genuineness, without knowing definitely the processes and formulae employed. With single tooth, bridge and partial denture restorations, the findings are laid before us in the way of clinics, papers, and books; however, the problems of the chromatics of full dentures are different from those of the partial restorations. Among the many differences, is the fact that in full dentures, the coloring in the face is the principal consideration in harmony of hue, while with the lesser restorations the coloring of adjacent teeth is the basis for harmony.

George A. Thompson makes the assertion that *color,* not tooth anatomy, is our chief obstacle in dental ceramics, and calls attention to the fact, that the old Brewster theory of the primary colors, red, yellow, and blue is false; that the primary colors with their true complements are: Red, with its complement of blue-green; green, with its complement of red-purple; violet-blue, with its complement of yellow.

Louis Weinberg in *Color in Everyday Life* presents in a practical way the importance of color harmony in dress, and the decorations and furnishings of the home with harmonious living. Clashing color and clashing mind have long been illustrated in a crude way by the red shirt and the angry bull.

Materials

In addition to a good groundwork in chromatics we must be familiar with the materials into which we must fuse, as it were, our ideas and available pigments.

Dental porcelains, like commercial porcelains, are composed of three ingredients, feldspar, the double silicate of aluminum and clay; silica (Si 02) silicic oxid, or quartz, the base of common sand; and kaolin, clay or aluminum silicate. Feldspar, of a yellowish pink, becomes colorless in the process fusing. Breaking up as it does, into plates, it permits a translucency somewhat similar to the dentin of a natural tooth. Silica gives stability and firmness to the body and holds the materials in shape so that in baking the general form is retained. Kaolin gives plasticity and strength to the ingredients.

Titanium oxid is used in most porcelain bodies. This imparts a yellowish cast. Other oxides used in tinting porcelains are: Oxid of Zinc, producing a lemon yellow; oxid of silver, a lemon yellow; oxid uranium, a greenish yellow; purple of cassius (double oxid of gold and tin) producing purplish red; oxid of gold, bright rose red; and sponge platinum and filings, grayish blue.

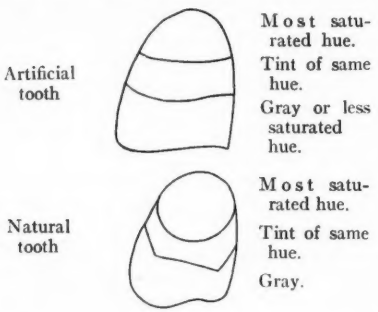
Manufacturers state that the proper hues are difficult to obtain, due to the fact that these mineral pigments (metal-

lic oxids) employed lose their color under the high degree of heat necessary to obtain a porcelain of the proper strength.

The stock material is worked up into: body, frit, flux, and enamel. The body, which represents the enamel of the natural tooth, is composed of feldspar, kaolin, silica, titanium oxid, and a little starch. Frits, colors prepared for enamels, are composed of pigment, feldspar, and flux which is a fine quality of glass, fused and reground for use. Flux is used to lower the fusing point of materials. Glass of borax is one of the principal ingredients. Enamels are composed of feldspar, frits, and a flux.

If we wonder how some manufacturers can produce sets of so-called teeth at so small a price, we have only to turn to the glass manufacturer and ask him how so many pieces of glass of one hue can be produced for so little money.

Forrest H. Orton has made same valuable suggestions and I am using his illustrations of differences in degree of saturation in artificial and natural teeth.



Staining

While the use of stains is indicated more in partial dentures, where adjacent natural teeth to be imitated are discolored from tobacco, medicines, or defective calcification, yet similar conditions are met with in the edentulous mouth, through a desire to duplicate the hues of stained natural teeth.

These may be applied with a stippling brush in such colors and on such surfaces or in such grooves as is desired. The vehicle used by these stains does not affect the color. Water may be used, but glycerin or oil of cloves serves the purpose better, because it allows the stain to be placed more easily and with more assurance that it will stay in the location desired.

In conclusion let it be emphasized that our profession is woefully weak in art, that pigments used in coloring the teeth for full dentures should be similar to those of the complexion, in most faces, showing somewhat of pink; that the porcelain body should be of texture similar to dentin, that oxids of different metals are used to produce the various hues, that color is affected by background, compactness of material and smoothness or striation of surface, that many natural effects can be produced by artistic staining, and lastly that our committee should spend both time and money in research work in the study of chromatics, becoming at least equal as an authority on the subject, to the manufacturer and the student of smaller ceramic dental restorations.

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RENAL CHANGES IN ESSENTIAL HYPERTENSION

By E. T. BELL, M.D., and THOMAS B. HARTZELL, M.D., D.M.D., F.A.C.D.
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(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

IN our study of chronic interstitial nephritis (Bright's disease), we first investigated the large group which is of inflammatory origin, usually due to streptococci. These have been reported in a previous publication.[1] Clinically, there is another large group often classed as nephritis because of symptoms from the urinary tract, but which is fundamentally a primary disease of the small arterioles throughout the body. This disease, which is the object of the present study, is commonly called primary hypertension. When the renal arterioles are severely involved, a clinical picture of chronic interstitial nephritis sometimes develops. The kidneys in primary hypertension sometimes become pitted and shrunken and resemble those of chronic glomerulonephritis, but there is only a remote histologic resemblance between the two diseases. In the study of the fundamental phenomena of nephritis it is essential that these two diseases of very different etiology should be kept distinct. With this purpose in mind, we present a report on the changes in the kidneys in essential hypertension.

Among about 4,000 necropsies, 218 cases of essential hypertension were found. All cases of organic valvular disease and glomerulonephritis have been excluded, as well as all cases of right ventricular hypertrophy. Three types are considered as essential hypertension: (1) ninety-three cases in which a systolic blood pressure above 150 was recorded; (2) eighty-seven fatal cases of myocardial insufficiency (chronic passive congestion of the liver at postmortem); out of this number, eighteen had low blood pressure, and in sixty-nine there was no record of blood pressure (nearly all of these had large hearts); and (3) thirty-eight cases with left ventricular hypertrophy (hearts weighing more than 500 gm.) with no record of blood pressure.

In 155 cases which were clinically cardiac disease, death was due to myocardial exhaustion (ninety-eight cases); coronary sclerosis (thirty-five cases); brain lesions (six cases); accident (two cases), and intercurrent diseases (seven cases). In seven cases, renal insufficiency was apparently a prominent contributory cause of death.

In sixty-three cases without any prominent cardiac symptoms, death was due to brain lesions (thirty-two cases); accident (ten cases); intercurrent diseases (ten cases), and undetermined cause (two cases). In nine cases, renal insufficiency was a prominent contributory cause of death.

In the 155 cardiac cases, 148 hearts weighed more than 450 gm., and 128, more than 500 gm. High blood pressure was recorded in five of those weighing less than 450 gm., and in fifteen of those weighing less than 500 gm. In the group without prominent cardiac

1. Bell, E. T., and Hartzell, T. B.: Arch. Int. Med. 29: 768, 1922.

symptoms (sixty-three cases), fifty-three hearts weighed more than 450 gm., and forty-six more than 500 gm. High blood pressure was recorded in seven of those with hearts weighing less than 450 gm., and in ten of those with hearts weighing less than 500 gm.

Judged by these postmortem statistics, essential hypertension is more than twice as frequent in males as in females. Ninety-six and seven-tenths per cent were more than 30 years old and 89 per cent were more than 40 years old. In chronic glomerulonephritis, about 70 per cent were more than 30 years old and 43 per cent were more than 40 years old.

The involvement of the arteries in the 218 cases is classed as severe in 64.8 per cent; moderate in 16.6 per cent; slight in 18.1 per cent, and with no involvement in 0.5 per cent. The involvement of the arterioles is classed as severe in 52.7 per cent, moderate in 18.5 per cent, slight in 12.7 per cent, and with no disease in 16.1 per cent. Severe arteriolar sclerosis is practically always associated with hypertension.

The amount of atrophy of the renal tissue, estimated roughly by the percentage of hyaline glomeruli, is as follows: Group 5 (atrophy more than 60 per cent), six cases; Group 4 (atrophy from 30 to 60 per cent), ten cases; Group 3 (atrophy from 10 to 30 per cent) seventeen cases; Group 2 (atrophy from 5 to 10 per cent), seventy-three cases. In more than 72 per cent the amount of atrophy is insignificant, and in only 7.8 per cent is the atrophy sufficient for one to expect any functional disturbance.

The size of the heart in this series has no relation to the degree of atrophy of the kidney or to the extent of involvement of the renal aterioles.

In the larger arteries, hypertension causes intimal thickening with a relatively large proportion of elastic tissue and a progressive atrophy of the media. In the arterioles and small arteries, there is an accumulation of hyaline material under the endothelium with a gradual atrophy of the media. In patients with permanent hypertension, a severe infection may cause thrombosis of many diseased arterioles, with resulting renal insufficiency.

Functional tests show that, when there is practically no loss of renal tissue, cardiac decompensation with resulting passive congestion of the kidney may cause marked reduction of the phenolsulphonephthalein excretion (as low as 20 per cent) and increase of urea nitrogen (from 40 to 60 mg.) in the blood. In a very small percentage of the cases, renal atrophy is extensive enough to show a definite renal insufficiency by functional tests. This is in sharp contrast to chronic glomerulonephritis, which always shows severe renal insufficiency in its terminal stages.

The evidence indicates that hypertension begins as a generalized spasm of arterioles and that the increased intravascular pressure causes a gradual hyaline degeneration of arterioles and hyperplastic-elastic intimal thickening of the small arteries.

HOW TO BUILD SOUND TEETH*

(Compiled by The American Academy of Periodontology, September, 1923)

It is the object of this bulletin to suggest what may be done to give Nature her chance to build sound teeth with sturdy supporting structures in the mouths of children.

RESPONSIBILITY OF PARENTS

We know from experience in animal breeding that the best, the healthiest and the strongest animals are the offspring of generations of sound and sturdy parents. The same is true of human beings, so the first and most important thing that parents may do for their children is to strive to be well and strong themselves.

ESSENTIALS TO RIGHT LIVING

In order to build sound teeth and sturdy supporting structures in the mouths of children, it is necessary that all the rules of right living be observed by both parents and the growing child. The observance of only one or two rules does not suffice to produce normal tissues, nor to keep them in a state of health when formed. All the essentials to right living must be intelligently practiced to gain the desired results.

Proper food, right thinking, cleanliness, wholesome exercise, fresh air, rest, refreshing sleep and pleasant recreation, all play a vital part in the normal functioning of the body cells.

Without the proper use of these essentials in the daily life we have learned to know that normal growth and full development of human beings is interfered with.

THE MOTHER'S RESPONSIBILITY

An especial responsibility rests upon the mother because normally the child depends solely on her for its nourishment during the greatest growth periods of its life—the prenatal and nursing periods. The child is dependent upon her for all the materials out of which the body is made, including the teeth.

GENERAL DIET ESSENTIALS FOR THE PREGNANT AND NURSING MOTHER

Every mother wishes her child to be strong and well. It is of utmost importance that her diet be suited not only to her own needs, but also to the needs of her developing child.

Milk, eggs, the green vegetables, fruits and whole cereals contain the elements which are needed.

EARLY PREGNANCY

During the first five months of pregnancy, the quality and right selection of food are more important than the quantity. The mother's food should meet

*Bulletin No. 1. This is one of a series of bulletins on the teeth and their care for the information of the public.

her own need, which usually is met when her body weight increases gradually and she feels well.

About the third month the baby's first, or deciduous teeth, begin to form.

LATER PREGNANCY

During the last four months the mother needs about one-fifth more food than normally.

The body building materials for the developing infant can come from only two sources—from the mother's food or from her own body tissues. If she does not eat the right kind and amount of food and assimilate it, then Nature takes care of the baby first and her own body suffers. For example, the baby must have lime, phosphorus and vitamins to grow and develop good teeth and bones, and if these substances are not supplied by the mother's food, they are taken from her own teeth and bones.

The mother should have during this and the nursing period:

Vegetables—two or more a day and including a leafy vegetable.
Fruit—two or more times a day and fresh whenever possible.
Cereals—use graham or whole wheat bread and coarse cereals, especially if there is a tendency toward constipation.
Meat, fish, poultry. Not more than once daily.
Milk or buttermilk—a quart daily used in cooking or as a drink.
Eggs occasionally in place of meat.
Not more than one cup of tea or coffee daily.
Water—six glasses daily—not at meals.
No fried foods, pastries, rich desserts, highly seasoned foods or stimulants.

AVOID OVEREATING

Any food which causes gas or other distress should be avoided.

Vary the food from day to day to avoid monotony and to be more sure that the mother is getting all the food elements needed.

Masticate all food long and thoroughly.

THE NURSING PERIOD

Extra food is needed during the nursing period to nourish the rapidly developing infant and to keep the mother well. The mother must supply the large quantities of food materials needed for her growing child. She must also furnish her own body with those materials which it has lost.

She may supplement her three daily meals with a glass of milk or milk and cereal at bed-time. She may need a glass of milk in the middle of the morning and afternoon.

TOOTH DECAY DURING PREGNANCY AND NURSING PERIODS

There is no reason why the normal mother's teeth should be harmed by pregnancy and nursing provided that she

Eats the right foods in proper proportions
Keeps her body clean
Has healthful exercise
Takes pleasant recreation
Has fresh air
Has refreshing sleep

Preserves a peaceful and happy state of mind
Takes proper care of her teeth and gums

Tooth decay during these periods, as at any other time, is evidence that the proper health essentials are not being observed or that there is some abnormality.

CARE OF MOTHER'S MOUTH

1. Keep mouth clean by brushing teeth three times daily.
2. Have teeth examined frequently—at least twice during pregnancy and twice during nursing period.
3. Tell dentist of condition, thus avoiding long sittings.
4. Have necessary dental work attended to promptly. There is no danger in doing so.
5. Neglect may result in infection with harmful results.
6. Thorough prophylactic treatment (cleaning) of the teeth at regular intervals by the dentist is a most valuable preventive aid.

Toothache, abscesses and bleeding gums are unnecessary and dangerous.

USE OF THE TEETH

The vigorous use of the teeth is most necessary both for the well-being of the teeth and their supporting tissues, and for the general health.

Teeth are in the mouth to grind food so that it will be finely divided and thoroughly mixed with saliva; therefore, they should be used.

Masticate all food so that it is thoroughly mixed with saliva.

Without proper mastication all the best nourishing qualities are not extracted from food in the process of digestion.

The saliva is the first digestive juice to come in contact with the food. It changes starches into sugars.

The proper digestion of food in the stomach and small intestines is dependent upon the adequate preparation given it in the mouth.

Lack of mastication is a fertile source of constipation. Constipation results in tissue poisoning, which interferes with wholesome nourishment of both mother and child.

Do not wash down food with liquids.

THE CHILD FROM BIRTH TO TWO YEARS

THE NURSING INFANT

The nursing infant should be breast-fed until the ninth month, under normal conditions.

There is no substitute which equals the mother's milk when all conditions are normal.

The development of the baby's jaws, teeth, skull and face and throat muscles is best furthered by breast feeding. The quality of the natural food, the exercise and stimulation to growth which comes with natural food and nursing is not to be had by artificial food and bottle nursing.

The nursing infant should have plenty of cool, boiled water between feedings.

At 3 months of age the baby may be given once a day

1. Orange juice, strained and diluted, beginning with 1 teaspoonful of juice to the same amount of cool boiled water. Increase amount

gradually until child is taking the juice of one-half orange at 1 year of age.

2. Or tomato juice strained and diluted.

The introduction of solid foods should be very gradual so as not to disturb the processes of development and growth.

At the sixth month introduce into the diet a well cooked wheat or oat cereal with the 10 o'clock breast feeding. Begin with a teaspoonful and gradually increase.

At from 8 to 10 months of age give a vegetable and cow's milk for the 2 o'clock feeding. Vegetables which may be given are carrots, peas, spinach, asparagus, cauliflower, onions, green string beans, summer or hubbard squash, celery, white turnips, swiss chard or potatoes cooked in a small amount of water, put through a sieve and served with a little butter or cream. Feed the child very small amounts at first.

Small quantities of the following stewed and strained fruits may be introduced into the diet at this period: apples, pears, raisins, prunes, dates and figs.

Give the baby who is 1 year old hard buttered toast or zwiebach with one meal. It encourages mastication.

ARTIFICIAL FEEDING

Consult a special advisor when artificial food must be used.

HARMFUL HABITS

1. Thumb or finger sucking
   Cause disfigurement of the jaws and face and bring about tooth irregularity.
   To prevent the habit secure a cardboard mailing tube about 2½ inches in diameter. (Larger for an older child.) Cut off a 4-inch length of the tube and attach a tape to either end. Slip tube over baby's arm so as to cover the elbow. With safety pins fasten the tapes to the sleeves. A plain cardboard cuff may be used instead of the tube.
2. Using a pacifier
   Causes flattening of the mouth and tooth irregularity and introduces air into the baby's stomach.
3. Mouth breathing.
   A sign of obstructions in the breathing passages—usually adenoids. Give this prompt attention. Causes irregularity of teeth, disfigurement of face, air starvation and greater susceptibility to children's diseases.
   Breathe through the nose.
4. Improper mastication.
   Prevent child from swallowing foods without proper chewing by *teaching it from the beginning to chew its food well.*

MASTICATION OF FOOD

"He who does not masticate well is an enemy of his own life."—Arab Proverb.

It is vitally important that the child should be encouraged to chew its food just as soon as it is given anything but liquids. Give the teething baby, very frequently, a freshly cooked chicken leg or thigh bone with no meat on it. Feed

the semi-solid foods to the baby very slowly and encourage chewing of them. A crust of tough, dry, whole wheat bread or bread stick, or a piece of zwiebach or dry toast given often to the teething child is excellent, because it demands mastication.

Do not feed the child who is eating any solid foods entirely on soft and soaked foods. Hard, tough breads and crackers with butter help to teach it to chew.

The teeth will cut their way through the gums more easily if the baby learns to chew while they are coming in.

Mastication helps to develop sound teeth in their proper places, and sturdy supporting tissues.

It helps greatly in keeping the child well.

The best foods will not give the best nourishment unless they are well masticated.

Unmasticated food is harmful and causes digestive, nervous and other serious disturbances which interfere with growth and development.

THE CHILD FROM 2 TO 6 YEARS

The child forms its habits early.

See to it that—

It masticates its food thoroughly.
It learns how to keep its mouth clean.
It has the right foods in proper proportions.
Its body is kept clean.
It has outdoor exercise and happy play.
It has plenty of rest and sleep.

DIET—Suggestions.

See that the child has plenty of coarse or hard food which requires mastication.

BREAKFAST

Milk or weak cocoa—1 to 2 cups.
Cereal—3 to 4 tablespoonfuls (well cooked) with ¼ cup milk.
Choice of wheat, oats, corn, barley, rice—whole grain.
Bread—toast or zwiebach, 1 or 2 slices with butter.
Stewed fruit—
Choice of apples, pears, prunes, apricots, figs, raisins, dates.

MAIN MEAL

An egg (never fried) 4 or 5 a week; a small amount of meat or fish on other days (boiled, broiled or roasted). Potato, plain boiled, mashed, baked, or in soup (never fried). Other vegetables either mashed or in soup.

Spinach	Carrots	Cauliflower
Celery	Onions	Asparagus
Lettuce	White Turnips	Green peas
Any other greens	String beans	Tomatoes
Dried beans	Peas	Squash

Butter on vegetables, egg, or other food.
Milk—1 cup.
Fruit—
Juice of an orange
Three prunes

Small dish of apple sauce
Or ripe apple, scraped (small amount)
One cooked pear, or ripe mashed pear (small amount)
Ripe banana, mashed (small amount)

EVENING MEAL

Bread—2 or 3 slices (more for children over 4 years of age) or zwiebach, or cereals—3 to 4 tablespoons.
Milk or cocoa—1 to 2 cups.
Vegetable or fruit (see list above).

The best form in which to use sweets is in their natural state. Sweet potatoes, carrots, fresh picked peas, beets, parsnips, raisins, dates, figs, currants, prunes and fresh fruits all contain large quantities of sugar. Strained honey, maple syrup, maple sugar and cane syrup may be used as sweets for older children.

For desserts use fruits, either fresh or stewed. They are cleansing to the mouth and therefore are protective to the teeth and gums.

SLEEP AND REST ESSENTIAL

Sleep and rest, so essential to everyone, are most necessary to the growing child.

The growing child should have ten hours of sleep at night and an hour's nap or rest after the noon meal. This rest is essential because only during rest and sleep does the body have an opportunity to recover its normal balance. Muscular and mental activity causes wear of body tissues and fatigue which can be relieved only by rest and natural sleep. The body cells cannot function properly without time for restoration.

THE TEMPORARY TEETH

At the age of 2 the first great change in the mouth has taken place and the child has its twenty temporary teeth.

> Guard them well! Keep them clean and free from cavities. Visit the dentist for his advice and examination. Have even tiny cavities filled. Sound temporary teeth are necessary to the health of the child, for without them food cannot be properly masticated. Pain from an exposed pulp (nerve) and pus from an abscess harm the child even more than the adult, for they interfere with its growth, as well as injure it in other serious ways.

From 6 months to 12 years of age the child has some of the temporary teeth in use. In the first five years of its life the child grows to one-half of its adult stature. It needs teeth in a state of health and usefulness so that it can prepare food for proper digestion and nourishment of its body.

The teeth should never be neglected in any way, whether they are temporary or permanent.

THE FIRST PERMANENT MOLAR

Between the fifth and sixth year the second great change in the mouth begins to take place.

The first permanent molar erupts!

There are four of them.
They begin to form before the baby's birth.
One comes in immediately behind each of the last temporary molars.
They are larger than the temporary molars.

They replace no temporary teeth.
They are meant to stay for life.

Watch for their coming and guard them against neglect, for they are the most important teeth in the mouth.

They are often neglected because parents do not recognize them as permanent teeth.

They are liable to decay because:

Of not receiving enough calcium and phosphorus in foods to build them stoutly and keep them safe.
The grinding surfaces have pits and grooves that sometimes are very deep, making them hard to keep clean.
Of not having coarse foods to polish them.
Of not having exercise from use in mastication.

AGES 6 TO 18

In these years the deciduous or temporary teeth are shed and the permanent teeth take their places in the dental arches.

DIET

As in the earlier years of growth, great care and attention must be given to furnishing those foods, in the right proportions and quantity, which will supply the necessary materials from which sound teeth and their supporting tissues are built.

The boy or girl may have the same foods that are served to the family. These should be:

Milk—1 quart a day, cooked in foods or as a drink.
Potatoes once a day.
Other vegetables twice a day, including a green leafy vegetable once a day.
Fruit—at least once a day, more often if possible.
Meat—not more than once a day.
Eggs sometimes in place of meat.
Water—6 glasses a day, preferably not at meals.
Whole grain breads at least 24 hours old and cereals from three to five times a week.
Sweet foods at end of meal.
Fried food only occasionally.

Teeth and their foundation structures which are built with faulty materials are always weakened so that they fall a prey to disease.

Well built structures which have been supplied with the right materials are resistant to disease.

HEALTH ESSENTIALS

The same health essentials apply to this as to all other ages, and upon their observance depends, to a great extent, the well-being of the growing boy and girl.

From the third month of prenatal life until the eighteenth year the body is building teeth, in all fifty-two of them, twenty in the first set and thirty-two in the second set. In other words, it takes eighteen years to produce the teeth which are to serve for a lifetime.

It is necessary that the teeth be soundly built and well protected by strong foundation tissues in order to perform their tasks.

CHILDREN'S TEETH—HOW TO USE AND KEEP THEM*

(Compiled by The American Academy of Periodontology, September, 1923)

Deciduous Teeth

What are deciduous teeth?

They are the first teeth. They come in from about the fourth month to 2 years of age.

How long should they last?

Until naturally shed between the ages of 6 and 12 years.

Are they important?

Yes. No effort should be spared to keep them.

Why are they important?

Because the child needs them to chew its food during the greater part of the most rapid growth period of its life. Because all of the deciduous teeth are in use for six years, and part of them as long as ten years of the child's life.

Are they as important as the permanent teeth?

Yes. In health or in disease they have a vital influence over the growth and development of the child's body and mind.

What are the usual signs of teething in healthy children?

An increased flow of saliva.
A tendency to put the finger or some hard article in the mouth and bite on it.
Swollen and congested gums.
Fretfulness and disturbed sleep.
Often a slight fever.
Loss of usual appetite.
Sometimes slight diarrhea.

How long do these symptoms last?

Usually only for three or four days, while the teeth are coming through the gums.

Is teething responsible for many of the ailments it is supposed to cause?

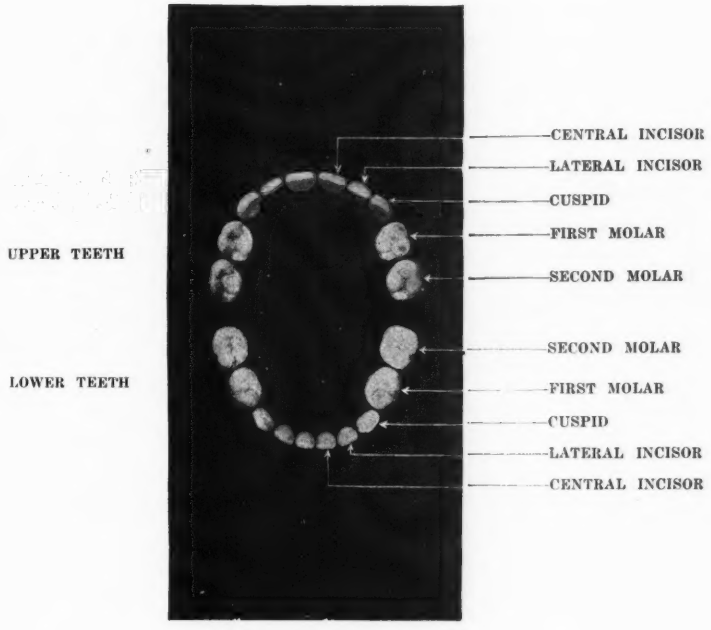
No. Most of the digestive disturbances occurring during babyhood are due to bad feeding and to chilling of the body.

What may be done to aid teething?

Give the baby right food, and plenty of cool boiled water. Give it a freshly cooked chicken leg or thigh bone without meat on it, to chew on. A hard dry crust of bread may be given also—as a teething ring.

*Bulletin No. 2, Part 1. This is the second of a series of bulletins on the teeth and their care, for the information of the public.

THE DECIDUOUS TEETH



AGE AT WHICH THEY ERUPT

Central incisors	4 to 9 months of age
Lateral incisors	7 to 10 " " "
First molars	12 " " "
Canines or cuspids	18 " " "
Second molars	2 years of age

Is lancing of the gums an aid in difficult teething?

Sometimes. Great care should be taken to keep the wound clean and so avoid infection after lancing.

When do deciduous teeth come in, or erupt?

Refer to the chart on page 451 of this bulletin.

What may be done to keep the deciduous teeth?

See that the child has plenty of the kinds of foods that furnish mineral salts and vitamins.

Give the child foods that are cleansing to the teeth.

Teach the child how to masticate all food thoroughly.

Keep the mouth clean.

Have teeth examined and treated at least two times a year.

See that the child has plenty of rest and sleep, fresh air and happy play.

What are the foods which furnish mineral salts and vitamins?

Milk and other dairy products, green vegetables, especially green leafy vegetables, fruits, breads and cereals made from whole grains.

Why are these foods necessary in keeping the teeth sound?

Without a sufficient supply of them the teeth are starved and, because not nourished, are more liable to disease.

What foods are cleansing to the teeth?

Fruits, raw vegetables, and coarse, hard foods such as dry toast, zwiebach and breads made from whole grains.

When should the fruits be eaten in order to have best cleansing effect on the teeth?

At the end of the meal.

Why is thorough mastication of food necessary?

For two reasons: First, because satisfactory nourishment of the body, including the teeth and the tissues that support them, depends upon proper digestion of food, and complete digestion of food is possible only when the food has been thoroughly masticated.

Second, because exercise of the teeth and their foundation tissues is necessary to their health and development, and the best way to exercise them is by *using* them.

How may the child be taught to masticate its food thoroughly?

Parents should set an example to their children.

Beginning with the teething period a child should be given a chicken leg or thigh bone (without meat on it) and hard dry crusts of bread made from whole grain flour. This accustoms it to using its jaws on hard foods.

From the very first spoonful of food given it, the child should be fed slowly and encouraged to chew. The cereals and breads must be masticated thoroughly in order to be digested.

After weaning do not feed the child entirely on soft or soaked foods.

As soon as the first temporary molars erupt, hard toast or zwiebach (buttered) should be given at least with one meal each day.

Do not allow any child to hurry while eating a meal. Hurry prevents proper mastication and digestion. Make the child sit at the table at least twenty minutes.

The parents must be eternally vigilant in encouraging their child to masticate its food sufficiently. There is nothing more important to the health and development of the growing child than the proper preparation, digestion and assimilation of food. Thorough mastication greatly aids these processes.

Should both sides of the jaws be used for masticating food?

Yes. It helps in the equal development of both sides of the head.

Is the daily cleansing of the mouth and teeth necessary?

Yes. There is danger to the teeth and gums and to the general health if the mouth is not kept clean. An unclean mouth is like a hotbed with fermenting and decomposing food for soil.

How may the baby's mouth be kept clean?

The baby's mouth should be let alone until the first teeth come in. The mother's breast should be cleansed during the nursing period with cool boiled water.

How should the erupting teeth be kept clean?

A piece of clean gauze or cotton wrapped around the mother's finger and dipped in a normal salt solution should be used to swab out the mouth and to cleanse the first few teeth that erupt.

Normal salt solution—½ level teaspoonful of salt to 1 glass cool boiled water.

How often should the teeth be cleansed?

After each meal.

Should parts other than the teeth be cleansed?

Yes, the gums, roof of the mouth, tongue and inside of cheeks and lips.

How soon may a toothbrush be used?

As soon as the first eight teeth are fully erupted, a very tiny, soft bristle brush may be used, before cleansing with the gauze or cotton.

What dentifrice should be used with the brush?

Normal salt solution. After the age of 2, if desired, an unmedicated tooth-paste may be used.

When may the cleansing of the mouth and teeth be done entirely with a small brush?

When all twenty of the deciduous teeth are in place.

In what manner should the teeth be brushed?

There are three good methods of brushing the teeth and gums. For brushing the deciduous teeth the circular stroke method is effective and is easily learned.

To brush the teeth and gums with the circular stroke method, place the brush inside the cheek with the bristle ends touching the teeth. Almost close the teeth and then, with a quick, light stroke in a round and round (circular) direction, brush the cheek and lip side of both upper and lower teeth.

For the tongue side of the teeth place the bristle ends of the brush on the teeth and with a quick, light, in and out stroke brush the gums and teeth of the upper and then of the lower jaw.

The occlusal or grinding surfaces of the teeth may be brushed with an in and out and a side to side stroke of the brush. Cleanse the tongue by brushing it with two or three light strokes.

A second good method of brushing the teeth is known as the rolling stroke method. To brush the teeth and gums with this method place the toothbrush, ends of the bristles *up,* for the upper teeth, between the cheek and the gums; turn the brush toward the gums, sweeping the bristles *down* over the gums and teeth to the cutting edges of the teeth. Reverse for the lower teeth and brush *up.*

This motion brushes the cheek side of all teeth and the tongue side of the back teeth.

Brush the inside of the front teeth by putting the brush, bristles up, on the roof of the mouth for the upper teeth and on the floor of the mouth for the lower teeth and pulling the brush outward over the gums and teeth.

Brush the grinding surfaces of the teeth with an in and out and side to side stroke of the brush.

Rinse the brush in clear water frequently while brushing the teeth.

Brush the tongue with two or three light strokes of the brush.

When should the teeth be brushed?

The teeth should be brushed for two minutes at least two times each day.

1. Before breakfast, and after breakfast if possible.
2. Before going to bed.

Brush the *gums* and teeth.

Be sure to reach all sides of the rearmost molars.

What kind of a toothbrush should be used?

A tiny, single row toothbrush for the baby. For the 2-year-old child, a *small* brush. The brush head should never be longer than 1¼ inches. The tufts of bristles should be set far apart and the bristles should be of medium stiffness.

Why should each person have his own toothbrush?

There is danger of infection and contagion if another person's is used.

What care should be given the toothbrush?

After using, it should be rinsed carefully, the bristles covered with salt and the brush hung up to dry in the sunshine and air. An unclean toothbrush is dangerous.

How soon should the child be taught to brush its own teeth?

Begin to teach it the use of the brush as soon as possible. Age 2 is not too soon to start.

How long should parents themselves give the child's mouth daily care?

Until the child has learned how to use the toothbrush successfully.

Should supervision by parents stop when the child has learned how to take good daily care of its mouth?

No, because without supervision most children fall into habits of neglect and lose interest.

When should the child first be taken to the dentist for examination?

Between the ages of 2 and 3 years. Earlier if there are any dark spots on the teeth.

How often should the child's teeth be examined by the dentist?

At least every six months. This is an excellent plan to follow because any cavities may be cared for promptly.

Are cavities in children's deciduous teeth common?

Yes, very.

What is dental caries?

A disease which destroys the teeth by producing cavities in them.

What causes dental caries?

Food particles left on the sheltered surfaces of the teeth where bacteria, protected by their glue-like covering, can act upon them and produce an acid which dissolves the tooth structure.

Are all teeth equally liable to caries?

No. Those which have been soundly built out of the best of materials and which are nourished by food that has plenty of the necessary elements in it are usually able to resist this disease.

Should carious temporary teeth be filled?

Yes. It is most important to have every cavity filled promptly.

What happens if the cavities in the deciduous teeth are not filled?

The tooth aches.
The pulp (nerve) dies.
An abscess forms at the end of the root.
The tooth becomes useless for chewing food.
The child's health is endangered.
The full development of the jaw is checked.
The shedding of the diseased roots is interfered with.
Eruption of the permanent teeth is disturbed.
Irregularity of the permanent teeth often results.

Is toothache serious?

Yes, it is a warning that there is a very large cavity, that the pulp is about to die, or that the tooth is already abscessed.

Why is an abscessed tooth dangerous to the health?

Because infection from the abscess often gets into the blood stream and is carried to other parts of the body, where the bacteria locate and cause disease in tissues that are not high in vitality.

Should hopelessly diseased teeth be kept in the mouth?

No. It is better to have them extracted and prevent the possibility of injury to the general health.

Do cavities furnish a growing place for bacteria?

Yes, especially for the bacteria of pneumonia, measles, scarlet fever and diphtheria.

What effect have carious teeth upon the digestion of food?

No child with broken down teeth can chew its food thoroughly. Unmasticated food cannot be well digested and assimilated, so the child suffers for want of proper nourishment, and also has digestive disturbances.

Does food crowding between the teeth do any harm?

It injures the gums and is apt to cause cavities to form.

Do green, black or yellow stains on the teeth mean anything?

Yes. The teeth are not being kept clean and are roughened so that they are liable to decay where the stains form.

Does thumb or finger sucking harm the teeth?

Yes. Both cause misplacement of the teeth and produce facial deformity.

Does mouth breathing affect the teeth?

It causes a narrowing of the jaws and irregularity of the teeth..

Should a baby be allowed to suck a pacifier?

No. It causes a flattening of the front of the mouth.

Why are irregular teeth undesirable?

They cannot function perfectly.
They are difficult to keep clean.
They are more liable to disease.
They are ugly.

How can the dentist help to keep the child's deciduous teeth?

By careful examination at least every six months.

By teaching the child how to brush the teeth and impressing it with the importance of thorough daily care.

By giving the teeth prophylactic treatments (preventive cleaning) at regular intervals. (From one to three months apart.)

By putting protecting fillings or medicines on tooth surfaces that seem likely to decay.

By placing restorative fillings in cavities.

By encouraging the child to eat the right foods.

Of what help are rest and sleep in keeping the teeth well?

They are necessary for the normal functioning of the body. Neither the body nor the mind is free from the harmful effects of lack of rest and sleep, and the health of the teeth and their supporting tissues suffers with the rest of the body.

Is fresh air necessary to the health of the dental structures?

Yes. It purifies the blood and supplies it with oxygen. This is just as necessary to the dental structures as it is to any other part of the body.

What effect does happy play have on the health of children's teeth?

It has a good effect that cannot be disregarded. Happy thoughts which the child has while at play are just as important to its well-being as food or any other essential to right living.

HYGIENE IN ITS RELATION TO PREVENTIVE DENTISTRY

By GRACE ROGERS SPALDING, D.D.S., Detroit, Michigan

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

HYGIENE is that science which concerns itself with the promotion and preservation of health. Public hygiene concerns itself largely with our environment, and through its medium many infectious diseases can be prevented. However, we are chiefly concerned today with that phase of our subject known as personal or individual hygiene, which must be applied by each person for himself, and which, if intelligently and faithfully practiced, will tend to prevent diseases of the degenerative type, such as those of circulation, nutrition, elimination and the central nervous system. Its practice will also increase our own innate powers of resistance against infectious diseases.

Albert T. Schofield states that "our organism is largely self-protective." Ziegler[1] refers to the "natural protective powers of the human body against infection." If the cells of our bodies have developed normally and are functioning normally, they can and do produce their own defenses against disease. Since Nature's methods, if not interfered with, may protect us against disease, does it not seem advisable for us to make every effort to cooperate with her by a thorough study of laws of health, giving to them complete recognition and applying them consistently in our own lives?

Since according to physiology the cell is the seat of life, we should be interested in the life processes of the cells which constitute our organism. Plant cells store potential energy as a result of their life activities; the animal cells, through the process of metabolism, consume and transform this energy, potential in the plant, into kinetic energy. Should we not use a part of the energy liberated by our cells to increase, strengthen and preserve our organism, rather than to deflect it back as a destructive force, as happens in fear, worry, overwork and other faulty health habits?

McCullom says, in referring to preventive dentistry, "The only logical and farseeing policy is to inquire into the cause of the poor quality and vulnerability of the present generation and to take up the task of instituting reforms in our habits of living which will free the next generation from the defects from which we are now suffering." The great need for dentistry today is in large part caused by degenerative conditions in the human body, making possible the destruction of the dental and periodontal tissues. These degenerative conditions are produced by an indifference toward, and a neglect of, correct habits of hygiene.

Fisher and Fisk[2] have described the human body as "a harp of a thousand strings which are intended to harmonize. If one of them is out of tune, it is

1. Ziegler: General Pathology.

2. Fisher and Fisk: How to Live.

likely to cause discord throughout, while to tune up one helps the harmony of all." It is on account of this close relationship between the body cells and the definite connection of each one with the central nervous system that what may affect constructively or destructively one group of cells may extend into different regions of the body to other cell groups.

ample of this point and of the benefits to be derived from deep breathing, since one frequently hears a singer remark, "I am in so much better health when I am singing and practicing."

Good results will usually follow the intelligent, systematic application of even one principle of individual hygiene. However, since this is true, we should not

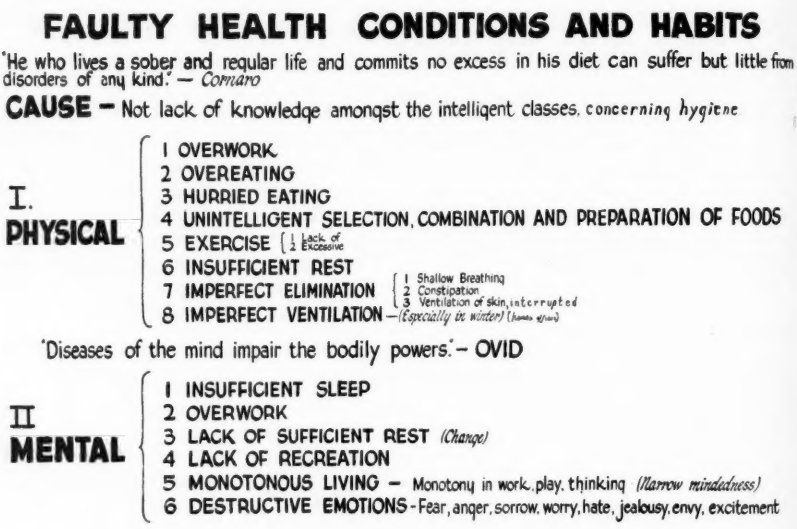

FAULTY HEALTH CONDITIONS AND HABITS
'He who lives a sober and regular life and commits no excess in his diet can suffer but little from disorders of any kind.' — Comaro
CAUSE — Not lack of knowledge amongst the intelligent classes, concerning hygiene
I. PHYSICAL
1 OVERWORK
2 OVEREATING
3 HURRIED EATING
4 UNINTELLIGENT SELECTION, COMBINATION AND PREPARATION OF FOODS
5 EXERCISE (½ Lack of ½ Excessive)
6 INSUFFICIENT REST
7 IMPERFECT ELIMINATION (1 Shallow Breathing 2 Constipation 3 Ventilation of skin, interrupted)
8 IMPERFECT VENTILATION — (Especially in winter) (home, office)
'Diseases of the mind impair the bodily powers.' — OVID
II MENTAL
1 INSUFFICIENT SLEEP
2 OVERWORK
3 LACK OF SUFFICIENT REST (Change)
4 LACK OF RECREATION
5 MONOTONOUS LIVING — Monotony in work, play, thinking (Narrow mindedness)
6 DESTRUCTIVE EMOTIONS - Fear, anger, sorrow, worry, hate, jealousy, envy, excitement
REMEDY — MODERATION IN ALL THINGS

Fig. 1

A specialist in physical culture, in dietetics or in pyschotherapy frequently produces most satisfactory results in the improvement of the general health and the treatment of disease. His successful results should prove that he is right at least to some extent, since by the application of his particular phase of individual hygiene alone the patient's condition is improved. We should carefully consider this fact, that the correction of faulty hygienic habits even in one direction only can improve the general health. Singers supply us with an excellent example of this point and of the benefits to be derived from deep breathing, since one frequently hears a singer remark, "I am in so much better health when I am singing and practicing."

Good results will usually follow the intelligent, systematic application of even one principle of individual hygiene. However, since this is true, we should not deny the value of other phases, all of which are important and worthy of our most serious consideration and application if we are interested in the prevention of disease.

Hygienic principles usually need to be modified to suit the condition and requirements of the person applying them. Bacon says, "A man's own observation, what he finds good of and what he finds hurt of, is the best physic to preserve the health." Patients respond readily when we manifest an interest in their general health, and we can render them a genuine

service if we intelligently advise them concerning individual hygiene. Before dentists advise their patients with regard to laws of health, it would be consistent for them to practice these laws themselves. Dentistry is an unhealthful activity, and needs much in the form of exercise, fresh air, sunshine, play, rest and sleep to counteract its detrimental effects. As a matter of fact, from necessity, ambition, enthusiasm or habit most dentists overwork, thereby breaking a fundamental health law.

Pope says, "Health consists with temperance alone," i. e., moderation in all things, and Goethe says, "True happiness springs from moderation." Work, play, rest, eat and sleep in moderation. Habitual intemperance in food, work or play, and indifference toward rest or sleep are destructive to our powers of resistance against disease and to the healthful functional activity of our mind and body cells. This applies to everyone, whether his activities of life are physical or mental.

There is no longer any question as to the effect of the mind on the body, and the particular effect of the emotions. If we might replace destructive thoughts and emotions with constructive ones, we would liberate Nature within our own bodies, instead of repressing and inhibiting her.

The purpose of the accompanying charts is to bring us face to face with our chief faulty health habits which, if we would correct them, would solve many of our most intricate dental and medical problems and would be a tremendous impetus to the next generation, mentally as well as physically.

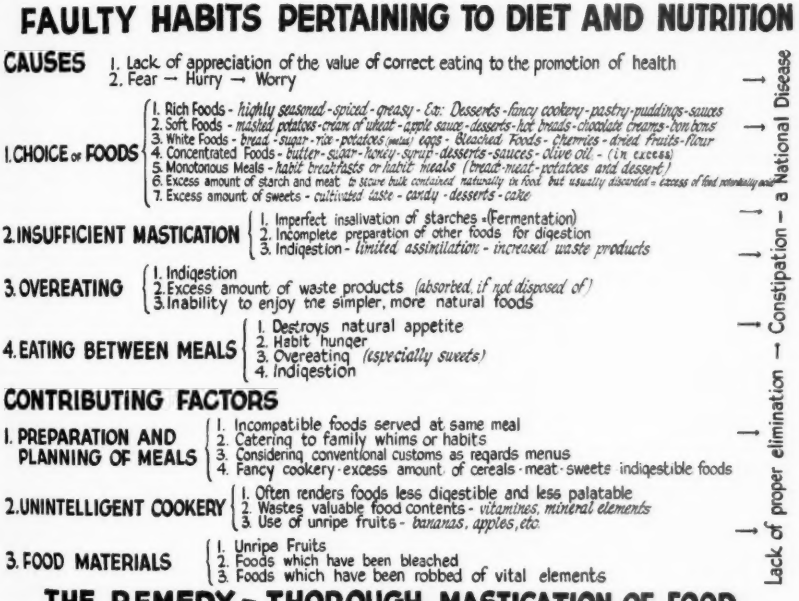

FAULTY HABITS PERTAINING TO DIET AND NUTRITION
CAUSES
1. Lack of appreciation of the value of correct eating to the promotion of health
2. Fear → Hurry → Worry
1. CHOICE OF FOODS
1. Rich Foods - highly seasoned - spiced - greasy - Ex: Desserts - fancy cookery - pastry - puddings - sauces
2. Soft Foods - mashed potatoes - cream of wheat - apple sauce - desserts - hot breads - chocolate creams - bon bons
3. White Foods - bread - sugar - rice - potatoes (mush) eggs - Bleached Foods - Cherries - dried Fruits - flour
4. Concentrated Foods - butter - sugar - honey - syrup - desserts - sauces - olive oil. - (in excess)
5. Monotonous Meals - habit breakfasts or habit meals (bread - meat - potatoes and dessert)
6. Excess amount of starch and meat (to secure bulk contained naturally in food but usually discarded = excess of food potentiality and
7. Excess amount of sweets - cultivated taste - candy - desserts - cake
2. INSUFFICIENT MASTICATION
1. Imperfect insalivation of starches (Fermentation)
2. Incomplete preparation of other foods for digestion
3. Indigestion - limited assimilation - increased waste products
3. OVEREATING
1. Indigestion
2. Excess amount of waste products (absorbed, if not disposed of)
3. Inability to enjoy the simpler, more natural foods
4. EATING BETWEEN MEALS
1. Destroys natural appetite
2. Habit hunger
3. Overeating (especially sweets)
4. Indigestion
CONTRIBUTING FACTORS
1. PREPARATION AND PLANNING OF MEALS
1. Incompatible foods served at same meal
2. Catering to family whims or habits
3. Considering conventional customs as regards menus
4. Fancy cookery - excess amount of cereals - meat - sweets indigestible foods
2. UNINTELLIGENT COOKERY
1. Often renders foods less digestible and less palatable
2. Wastes valuable food contents - vitamines, mineral elements
3. Use of unripe fruits - bananas, apples, etc.
3. FOOD MATERIALS
1. Unripe Fruits
2. Foods which have been bleached
3. Foods which have been robbed of vital elements
THE REMEDY - THOROUGH MASTICATION OF FOOD
Lack of proper elimination ↑ Constipation - a National Disease

Fig. 2

In order to make my comments constructive, I have suggested remedies which will materially decrease our faulty hygienic habits. The first remedy is moderation in all things "even in pa'snips," as an old New Englander used to say. We should use moderation even in the interpretation and application of rules of hygiene.

The second remedy suggested is the thorough mastication of food. If we would adopt as our slogan—"Moderation and Mastication," we would be several paces ahead of our present health status.

We should encourage the enthusiastic use of the masticating apparatus for the preparation and digestion of food, especially starches. If we as dentists (to quote Dr. Leroy Johnson) should "produce and maintain the normal functional activity of the masticating apparatus," may we ask to what end is this service rendered unless we urge and insist that this masticating apparatus function to the upbuilding of our patient's health?

Better to search in fields for health unbought.
Than fee the doctor for a nauseous draught.
The wise for cure on exercise depend.
God never made his work for man to mend.
Dryden

PACKING FULL UPPER PLATE

By W. T. SIMS, D.D.S., Hillsboro, Texas

THE accompanying illustrations show a method of packing a full upper rubber plate that has proved much more satisfactory than the usual practice of filling the upper part of the flask with rubber before attempting to close the flask in boiling water.

The pink rubber should be packed around the pins in the usual way, but the pink rubber should not be brought to the top of the mold. The base rubber should then be packed around the pins, over the pink and around the periphery of the mold. A slight excess of base

Fig. 1

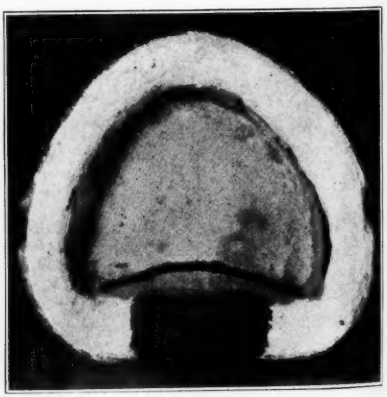


Fig. 2

rubber should be put in over the pink and the teeth, but no rubber should be placed in the center of the mold. With cloth in place, the flask should be placed in the spring clamp, and water put on to boil. The screw pressure will close the flask. On opening the flask for first time, it will appear as shown in Fig. 1. If a small quantity of base rubber extends over the outer edge of the mold, it should be trimmed off. Should the mold contain an excess of base rubber over the pins, it will flow under pressure to the center of the mold. One should then proceed to fill the center of the mold with base rubber.

The investment should be trimmed with a knife from the distal border of the base plate to the edge of the flask, as shown by the shaded portion in Fig. 2. This is done to allow the rubber (which expands in the process of vulcanization) to escape through this outlet rather than through waste gates.

The advantages of this method of packing are:

1. It allows a maximum amount of base rubber, and minimum of pink, and practically eliminates the probability of the base rubber showing through the pink after vulcanization.
2. It makes a stronger plate.
3. It is a great timesaver in packing a plate.
4. By leaving the center of the mold free of rubber in the first pack, the pressure (on cast and investment) necessary to close the flask is greatly lessened.

The flask being more easily closed, the chances of errors of occlusion by the imperfect closing of the flask are greatly reduced.

DECIDUOUS TEETH

By LOUIS OTTOFY, D.D.S., M.D., Chicago, Illinois

THE editorial in the November issue on "Is the Dental Profession to Make Good?" strikes the nail on the head, and directs attention to an important subject.

I have recently completed the survey of a private school, examining 843 children with a total of 19,524 teeth, of which number 5,153 were carious in all stages, including roots. As many of the teeth had more than one cavity, the total number of operations required, exclusive of orthodontic cases, numbered 5,775.

From conversation with some of the children and their parents, I am convinced that it has been a grave error on our part, for so many years, to preach about the importance of the first permanent molar; I found the belief general that no attention should be paid to the deciduous teeth. On pointing out to them the carious first permanent molars, without exception my work was disputed by the children as well as their parents, they being positive that the tooth in question belonged to the temporary set. The result has been this: we have so long directed attention to, and stressed the importance of, this particular tooth, that we have created, in the minds of the general public, the belief that no attention need be paid to the teeth until this particular tooth erupts. Hence, many parents pay no attention to the teeth of the child until sometime after this tooth has erupted, taken its place, become affected with caries, and has sometimes been completely destroyed.

The teachings of the profession are quickly reflected in the public mind. Years ago, when we found it so difficult to reach the third molars, when we did not have proper light, lacked satisfactory submarine filling materials, used plastics which were worthless unless kept dry for some time, and had difficulty in putting on the rubberdam, etc., we originated and circulated the dictum that the "wisdom tooth was no good anyhow." Thousands were extracted, and even to this day, the belief persists among many people that this tooth is not worth saving. The same is today true of the deciduous teeth. The difficulty of handling children, the lack of education of the parents concerning the importance of the deciduous teeth, our failure to educate parents that such service is worth money and that the fee must be governed, not by the number and character of the fillings or service, but by the time consumed, all have contributed to an almost universal neglect of the deciduous teeth.

It is my firm belief that we should no longer concern ourselves with teaching the importance of the permanent teeth. No one of fair intelligence questions the soundness of that policy. We should turn about face, and teach the public nothing but the care of the deciduous teeth. If that advice is followed, it will always give the dentist an opportunity to point out to the parent the presence of the first permanent molar and of other permanent teeth, and establish that early care which is so all important in prevention.

In a paper which I read in 1882, I said: "Our duty as a profession will

not be fulfilled until the time has arrived when, after fighting our battles, we shall have won the paramount victory, the prevention of dental caries; when the time of its members will be occupied by the prevention rather than the repair of the ravages of caries."[1] Can that statement of forty years ago be improved on today?

In 1882, I examined 355 children; in 1923, 843. I took the statistical figures of 1923, and reduced them by striking an average, as though I had examined but 355, with the following remarkable result:

355 children	1882	1923
Number of teeth examined	8,239	8,224
Number of sound and filled teeth	6,132	6,220
Number of carious teeth	2,107	2,004

Note the very slight improvement. This is due to the fact that in 1882 the average number of fillings found was one to every ten children, while in 1923 the average is eleven fillings to every ten children. But this progress was offset by increase in caries, so that the situation among these children today is identical with what I found over forty years ago. In 1882, I stated that "the number of teeth equally divided would give each child seventeen sound and six carious teeth." In a paper I am preparing on the examination of 1923, I say "the number of teeth equally divided would give each child sixteen sound teeth, one filled tooth and six carious teeth." The communities where the examinations were made are about the same, the great middle class of our country. Forty years ago, each child had six carious teeth, and today each child has the same number. Where is the progress?

How to solve the problem is a serious matter. In your editorial you ask the question, why the situation is as it is, and suggest that dentists should pay more attention to the deciduous teeth. There is a wide open field for the pedodontist—may his number increase! Pedodontia deserves, first of all, to become a more generally accepted, recognized and appreciated specialty. In solving the problem, self-interest must be considered. A general practitioner is reluctant to recommend the children of his patients to some other general practitioner, who, perchance, by the kindly, competent treatment of the children, may unintentionally still unfavorably influence the parent toward the regular dentist. This will not be the case when the number of pedodontists increases, and when men and women will devote their entire time to children, as is the case with the orthodontist, exodontist, etc., each in his respective field. The lack of specialists is the principal reason why dentists, as a rule, are prone to recommend nothing to be done to care for the deciduous teeth. It requires educating the public in order to bring it up to a full understanding of the subject, teaching that the salvation of the deciduous teeth is the most important, for the care of the permanent teeth will naturally follow, and to impress the fact that dental services for children must be compensated for on a time basis.

1. Ottofy, Louis: The Incipiency of Dental Caries, Ill. State Dent. Soc., 1883, p. 57.

HISTORICAL RECORD OF THE AMERICAN DENTAL ASSOCIATION

By OTTO U. KING, D.D.S., F.A.C.D., Chicago, Illinois

The American Dental Association was organized at Niagara Falls, N. Y., Aug. 3, 1859. Permanent organization was effected in Washington, D. C., July 31, 1860, when the officers pro tem were succeeded by regularly elected officers. In 1861 no session was held, owing to the Civil War; since then, the sessions have been held annually. In 1897 the Association united with the Southern Dental Association, and the name was changed to the "National Dental Association," which name was retained until 1922, when the earlier name was resumed. A complete list of the officers and sessions is as follows:

AMERICAN DENTAL ASSOCIATION

TERM	PRESIDENT	CORRESPONDING SECRETARY	RECORDING SECRETARY	DATE OF MEETING	PLACE OF MEETING
1859	W. W. Allport		J. Taft	1859	Niagara Falls
1859-60	W. W. Allport		J. Taft	1860	Washington, D. C.
1860-61	W. H. Atkinson	W. M. Rogers	J. Taft	No meeting	
1861-62	W. H. Atkinson	W. M. Rogers	J. Taft	1862	Cleveland, O.
1862-63	Geo. Watt	J. F. Johnson	J. Taft	1863	Philadelphia, Pa.
1863-64	W. H. Allen	C. R. Butler	J. Taft	1864	Niagara Falls
1864-65	J. H. McQuillen	G. W. Ellis	J. Taft	1865	Chicago, Ill.
1865-66	C. W. Spaulding	L. D. Shepard	J. Taft	1866	Boston, Mass.
1866-67	C. P. Fitch	A. Hill	J. Taft	1867	Cincinnati, O.
1867-68	A. Lawrence	C. R. Butler	J. Taft	1868	Niagara Falls
1868-69	Jonathan Taft	J. McManus	Edgar Park	1869	Saratoga Springs
1869-70	Homer Judd	I. A. Salmon	M. S. Dean	1870	Nashville, Tenn.
1870-71	W. H. Morgan	I. A. Salmon	M. S. Dean	1871	White Sulphur Springs, W. Va.
1871-72	G. H. Cushing	I. A. Salmon	M. S. Dean	1872	Niagara Falls
1872-73	P. G. C. Hunt	J. Taft	M. S. Dean	1873	Put-in-Bay, O.
1873-74	T. L. Buckingham	J. Taft	M. S. Dean	1874	Detroit, Mich.
1874-75	M. S. Dean	G. L. Field	C. S. Smith	1875	Niagara Falls
1875-76	A. L. Northrop	J. H. McQuillen	C. S. Smith	1876	Philadelphia, Pa.
1876-77	Geo. W. Keely	J. H. McQuillen	C. S. Smith	1877	Chicago, Ill.
1877-78	F. H. Rehwinkel	M. H. Webb	M. S. Dean	1878	Niagara Falls
1878-79	H. J. McKellops	A. O. Rawls	G. H. Cushing	1879	Niagara Falls
1879-80	L. D. Shepard	M. H. Webb	G. H. Cushing	1880	Boston, Mass.
1880-81	C. N. Peirce	A. M. Dudley	G. H. Cushing	1881	New York, N. Y.
1881-82	H. A. Smith	A. M. Dudley	G. H. Cushing	1882	Cincinnati, O.
1882-83	W. H. Goddard	A. W. Harlan	G. H. Cushing	1883	Niagara Falls
1883-84	E. T. Darby	A. W. Harlan	G. H. Cushing	1884	Saratoga Springs
1884-85	J. N. Crouse	A. W. Harlan	G. H. Cushing	1885	Minneapolis, Minn.
1885-86	W. C. Barrett	A. W. Harlan	G. H. Cushing	1886	Niagara Falls
1886-87	W. W. Allport	A. W. Harlan	G. H. Cushing	1887	Niagara Falls
1887-88	Frank Abbott	F. A. Levy	G. H. Cushing	1888	Louisville, Ky.
1888-89	C. R. Butler	F. A. Levy	G. H. Cushing	1889	Saratoga Springs
1889-90	M. W. Foster	F. A. Levy	G. H. Cushing	1890	Excelsior Springs
1890-91	A. W. Harlan	F. A. Levy	G. H. Cushing	1891	Saratoga Springs
1891-92	W. W. Walker	F. A. Levy	G. H. Cushing	1892	Niagara Falls
1892-93	J. D. Patterson	F. A. Levy	G. H. Cushing	1893	Chicago, Ill.

TERM	PRESIDENT	CORRESPONDING SECRETARY	RECORDING SECRETARY	DATE OF MEETING	PLACE OF MEETING
1893-94	J. D. Patterson	F. A. Levy	G. H. Cushing	1894	Old Point Comfort
1894-95	J. Y. Crawford	E. E. Chase	G. H. Cushing	1895	Asbury Park, N. J.
1895-96	J. Y. Crawford	E. E. Chase	G. H. Cushing	1896	Saratoga Springs
1896-97	James Truman	F. A. Levy	G. H. Cushing	1897	Old Point Comfort
		NATIONAL DENTAL ASSOCIATION			
1897-98	Thomas Fillebrown	E. E. Chase	G. H. Cushing	1898	Omaha, Neb.
1898-99	H. J. Burkhart	E. E. Chase	G. H. Cushing	1899	Niagara Falls
1889-1900	B. Holley Smith	E. E. Chase	G. H. Cushing	1900	Old Point Comfort
1900-01	G. V. Black	M. E. Gallup	A. H. Peck	1901	Milwaukee, Wis.
1901-02	J. A. Libbey	J. D. Pfeiffer	A. H. Peck	1902	Niagara Falls
1902-03	L. G. Noel	W. D. Tracy	A. H. Peck	1903	Asheville, N. C.
1903-04	C. C. Chittenden	C. S. Butler	A. H. Peck	1904	St. Louis, Mo. (Business only)
1904-05	W. E. Boardman	C. S. Butler	A. H. Peck	1905	Buffalo, N. Y.
1905-06	M. F. Finley	C. S. Butler	A. H. Peck	1906	Atlanta, Ga.
1906-07	A. H. Peck	B. L. Thorpe	C. S. Butler	1907	Minneapolis, Minn.
1907-08	William Carr	B. L. Thorpe	C. S. Butler	1908	Boston, Mass.
1908-09	V. E. Turner	H. C. Brown	C. S. Butler	1909	Birmingham, Ala.
1909-10	B. L. Thorpe	H. C. Brown	C. S. Butler	1910	Denver, Colo.
1910-11	E. S. Gaylord	C. W. Rodgers	H. C. Brown	1911	Cleveland, O.
1911-12	A. R. Melendy	C. W. Rodgers	H. C. Brown	1912	Washington, D. C.
1912-13	F. O. Hetrick	C. W. Rodgers	H. C. Brown	1913	Kansas City, Mo.
			GENERAL SECRETARY		
1913-14	H. C. Brown		Otto U. King	1914	Rochester, N. Y.
1914-15	D. M. Gallie		Otto U. King	1915	San Francisco (H. of D. only)
1915-16	T. P. Hinman		Otto U. King	1916	Louisville, Ky.
1916-17	L. L. Barber		Otto U. King	1917	New York, N. Y.
1917-18	W. H. G. Logan		Otto U. King	1918	Chicago, Ill.
1918-19	C. V. Vignes		Otto U. King	1919	New Orleans, La.
1919-20	J. V. Conzett		Otto U. King	1920	Boston, Mass.
1920-21	H. E. Friesell		Otto U. King	1921	Milwaukee, Wis.
		AMERICAN DENTAL ASSOCIATION			
1921-22	T. B. Hartzell		Otto U. King	1922	Los Angeles, Cal.
1922-23	J. M. Buckley		Otto U. King	1923	Cleveland, O.
1923-24	W. A. Giffen		Otto U. King	1924	Dallas, Texas.

The Journal of the American Dental Association

5 North Wabash Avenue, Chicago, Illinois.

Please send in promptly notice of change of address, giving both old and new. Important information regarding subscription price, etc., will be found in the advertising pages.

Editorial

THE DALLAS MEETING

The meeting next November at Dallas, Texas, seems to be taking shape in a very encouraging manner. The chairmen of the various sections report that good progress is being made in the preparation of their programs. The local committee is working hard to have everything in readiness for the meeting, and we are assured that Dallas can take care of as many members and guests as may choose to come. The President and Secretary visited Dallas last autumn, and found that ample facilities are available for the largest possible number who are likely to attend.

The chairman of the clinic committee has his work so well in hand that it will prove of interest to our readers to note the progress that has been made to date, and we therefore take pleasure in reproducing the statement he has prepared to show the plan of the clinics and the work already accomplished.

CLINIC DETAILS

Clinics to be given at the meeting of the American Dental Association in Dallas, November 10-14, 1924, will consist of five types: (1) State Clinics; (2) Section Clinics; (3) Group or Study Club Clinics; (4) New South Clinics, and (5) Junior Clinics.

The State individual clinic group will be placed upon a representative basis by requesting each state society to furnish clinicians for this group to the number of one to the allotted number of delegates.

No one will be permitted to hold a clinic in this group without the recommendation of the president of his respective state society.

All states will be invited to hold clinics in this group except the states hereinafter mentioned as the New South.

All State Clinics will be staged Thursday afternoon, November 13.

Section Clinics will be taken care of by the chairmen of the seven different sections and each one will be requested to furnish three clinics from his respective section.

No one will be allowed to hold a clinic in this group without the endorsement of his respective section chairman.

Group or Study Club Clinics will be secured by inviting each state society to furnish not to exceed three groups of not over ten clinicians in any group.

These groups will consist of a number of clinicians who will demonstrate their subjects in successive steps and no group will be allowed to hold clinics without the endorsement of the president of the respective state society.

New South and Junior Clinics will be handled by our host, and the committee in charge is now active in securing the proper material.

The states represented in the New South Clinic are Texas, Southern California, Arizona, New Mexico, Oklahoma, Mississippi, Arkansas and Louisiana (eight states).

The Junior Clinic will consist of a number of 1920, 1921, 1922 and 1923 graduates who will hold clinics on various subjects, and Texas has promised us a pleasant surprise in both the New South and Junior Clinics.

All clinics except State Clinics will be staged Friday morning, November 14.

H. B. PINNEY, *General Chairman of Clinics.*

It will thus be seen that even at this early date very much has been done in anticipation of the meeting. We are assured that the month of November is usually delightful in Texas, and when we consider that this is the first meeting of the Association in this section of the country we must all acknowledge the obligation we owe to Texas to turn out to a man and make this meeting the best that has been held to date.

Our colleagues of the South have been loyally coming north year after year to attend the meetings, and we all should show an equal consideration for them and go in a mass to Dallas. It is none too early to begin planning for the event. Time slips by rapidly and November is not so very far off.

TRANSPORTATION TO THE AMERICAN DENTAL ASSOCIATION MEETING AT DALLAS, TEXAS

A rate of one and one-half fare on the Round Trip Identification Certificate Plan has been authorized by practically all of the railroads of the United States.

These certificates will be mailed to each member of the Association in ample time for the meeting. When they are filled out and presented to the local agent, members and dependent members of their families may purchase round trip tickets, good going, November 6-12 inclusive, with return limit, November 20. Pacific Coast points date of sale one day earlier and return one day later.

For the convenience of members, a special train has been arranged via the Illinois Central, Missouri Pacific and Texas & Pacific railroads. Passengers from territory tributary to Chicago will arrive in time to leave on special at 3:00 p. m., November 7. Passengers via St. Louis will arrive there in time to leave on special at 10:30 p. m., November 7. The special is scheduled to arrive in Little Rock, Arkansas at 8:00 a. m., Saturday, November 8. The day will be divided between Little Rock and Hot Springs, parties leaving that night and arriving in Dallas the following morning.

The present plan includes an automobile ride through Little Rock followed by a sixty-mile motor trip through the Ozarks to Hot Springs. The Hot Springs Business Men's League expects to entertain the party with a trip about the city and vicinity. Complimentary use of the bath houses and golf course is included.

OLD MEXICO

The Transportation Committee is working on a ten-day or two weeks' tour of Old Mexico following the Dallas convention. Details on this trip will be covered in subsequent issues.

Transportation Committee, American Dental Association,

D. C. BACON, *Chairman.*

RUSSIAN RELIEF

AMERICAN DENTAL ASSOCIATION

Arkansas State Dental Society		
*Cash		$ 5.00
California State Dental Society		
*Cash		685.10
Colorado State Dental Society		
*Cash		302.50
Connecticut State Dental Society		
*Cash		400.00
District of Columbia Dental Society		
*Cash		100.00
Florida State Dental Society		
*Cash		200.00
Georgia State Dental Society		
*Cash		50.00
Illinois State Dental Society		
*Cash		2,104.00
Indiana State Dental Association		
*Cash		233.00
Iowa State Dental Society		
*Cash		110.00
Maryland State Dental Society		
*Cash		5.00
Massachusetts State Dental Society		
*Cash		5.00
Michigan State Dental Society		
*Cash		5.00
Minnesota State Dental Society		
*Cash		20.00
Mississippi State Dental Society		
*Cash		200.00
Missouri State Dental Society		
*Cash		10.00
Navy Dental Corps		
*Cash		2.00
New Jersey State Dental Society		
*Cash		10.00
New York State Dental Society		
*Cash	$ 880.00	
Irving E. Strong, New York City	5.00	
		$ 885.00
North Carolina State Dental Society		
*Cash		300.00
North Dakota State Dental Society		
*Cash		10.00
Ohio State Dental Society		
*Cash		512.50
Oklahoma State Dental Society		
*Cash		4.00
Pennsylvania State Dental Society		
*Cash	$ 217.00	
Eastern Dental Society of the City of Philadelphia	357.50	
Odontological Society of Western Pennsylvania	101.00	
		$ 675.50
Porto Rico Dental Society		
Porto Rico Dental Society		50.00
Southern California Dental Society		
*Cash		632.00
South Dakota State Dental Society		
*Cash		11.00
Tennessee State Dental Society		
*Cash		90.00
Texas State Dental Society		
*Cash		214.00
Washington State Dental Society		
*Cash		10.00
West Virginia State Dental Society		
*Cash		2.00
Wisconsin State Dental Society		
*Cash		615.00
Total amount received from state societies		$ 8,457.60
*Contributions paid direct to Dr. Aguilar, Madrid, Spain		$ 2,604.00
Total American Dental Association April 10, 1924		$11,061.60

RUSSIAN RELIEF
AMERICAN DENTAL TRADE ASSOCIATION

*Cash		$5,462.00
Harmeyer-Brand Co., Cincinnati, Ohio	25.00	
Easton Dental Supply House, Easton, Pa.	10.00	
		$ 5,497.00

RUSSIAN RELIEF
FOREIGN

*Cash	7.17	
George E. Payne Philpots, Victoria, Australia	4.25	
		$ 11.25
Total collections to April 10, 1924		$16,570.02

JAPANESE RELIEF

AMERICAN DENTAL ASSOCIATION

*Cash		$1,100.00
**Tenth District Dental Society, Georgia,	25.00	
New Mexico Dental Society	5.00	
Total collections to April 10, 1924		$ 1,130.00

DENTAL INSTRUMENTS, BOOKS, MAGAZINES AND SUPPLIES

*Additional instruments, books, magazines and supplies received:

S. S. White Dental Mfg. Co., Chicago, Ill., (Instruments).

S. Yoshino, Chicago, Ill., (Magazines).

J. S. Frost, Burlington, N. C., (Instruments).

A. W. Blunt, Clinton, Iowa, (Instruments).

Unknown (Two packages of magazines).

*Itemized list of contributors given in previous issues of THE JOURNAL.

**We erroneously credited Dr. C. E. Blandenburg, Augusta, Georgia, with this amount in the March issue. Dr. Blandenburg sent the contribution in as an officer of the Tenth District Dental Society.

Medical and Dental News

DELAWARE

The Lincoln "University.": Disclosure of an alleged "diploma mill" with headquarters in Wilmington (J. A. M. A., Dec. 29, 1923, p. 2192), known as "Lincoln University Inc.," has recently been made. This "university" purports to offer degrees in medicine, dentistry, theology, law, literature, engineering, pharmacy, psychology, mental therapy, philosophy, and other subjects, from correspondence courses and for a fee as low as $100. Complaint that the "university" was using the mails to defraud was made to the Philadelphia postal authorities by Dr. Alexander Reynolds, secretary of the Pennsylvania State Board of Dental Examiners, according to reports. Maxwell Steinberg, D.D.S. and Ph.D., is president of the Lincoln "University" with headquarters at 832 Market Street, Wilmington (address on stationery of the "university"). But on investigation, it was found that there is no "university," or anything resembling a college, school, or clinic at the address given. It is the office of Franklin Mettler "corporation organizer" who admits, it is stated, to being the legal representative of the Lincoln University Inc., and as such performs such services as receiving mail and forwarding it to what he said is the real scene of the "university's" operations in New York, 1263 Broadway being the address given. This is not the "university's" address and never has been, according to the occupants of that building. "Dr." Maxwell Steinberg, president and chief incorporator of the "university" appears in the New York telephone directory as a chiropractor, 544 Dumont Avenue, Brooklyn. At this address there is a huge sign announcing Dr. Steinberg as a dentist. On his walls was a diploma giving him the degree of doctor of dental surgery, issued by the Oriental University, Washington, D. C., June 6, 1921. There was another degree issued by "Oskaloosa College," Iowa, entitling Steinberg to the degree of "doctor of philosophy."

"Dr." Steinberg was "out" when the investigator called. The Delaware charter granted to Steinberg and his associates, Hannah Steinberg and George M. Anton, New York, permits Lincoln "University" to issue degrees in almost any science. Appended is a certification by Charles E. Hughes, Secretary of State, attesting the seal of the Secretary of the State of Delaware. Steinberg, in choosing a name for his "educational" institution, stumbled on the one which has been in use for nearly forty years by a negro college in Chester County, Pa., Lincoln University. There is no connection between this institution and the corporation chartered by Steinberg. Investigation was started it is reported, when Luis Martin Valbuena, a Venezuelan, who same to the United States to take a course in dentistry, was granted a degree in dentistry by Lincoln "University." There was some difficulty about its acceptance in Venezuela so Steinberg wrote to the Venezuelan consul in New York requesting him to visé his signature as president of Lincoln "University," "a chartered institution of higher learning in the State of Delaware." Through the consul, notice of this was brought to Dr. Reynolds, who advised against the visé. Dr. Reynolds then induced a friend in San Juan, Porto Rico, to write to Lincoln University, regarding its course in dentistry. The reply, signed by Steinberg, offered a correspondence course "leading to the D.D.S. degree for $100, paid in advance, or if paid by installment, with 20 per cent additional charge." Later news announces the arrest of "Dr." Maxwell Steinberg, who admitted, it is reported, a brief connection with the "university."—Journal of the American Medical Association, Jan. 5, 1924.

FLORIDA

Organizations Promote Health Education: At a meeting of state organizations for the promotion of health education in public schools, in Jacksonville, January 26, a state health education council was formed. The council will coordinate the health education work of organizations in the state to promote health education. A speakers' bureau was established to furnish trained lecturers on health subjects. The state teachers' training institutions will be asked to add to their curriculum, for both winter and summer sessions, a course of study in health education. Organizations represented were: the state medical association, the state board of health, the bureau of child welfare, state department of education, the American Red Cross, Florida State College for Women, home economics department, modern health crusade, the University of Florida, the state and county dental societies, the state federation of women's clubs and the state parent-teacher association.—Journal of the American Medical Association, Feb. 23, 1924.

CHICAGO, ILLINOIS

Films for Distribution: The Chicago Tuberculosis Institute has a number of films concerning public health which may be borrowed, free of charge. "The Gift of Life" has just been received from the state board of health; other films on themes such as prenatal care, infant welfare, child health, health examinations, tuberculosis, teeth, diphtheria and scarlet fever are ready for distribution.—Journal of the American Medical Association, Feb. 16, 1924.

KANSAS STATE BOARD OF DENTAL EXAMINERS

Kingman, Kansas, Feb. 11, 1924.
Winslow vs. Dental Board, No. 24987 in Supreme Court of the State of Kansas.
Brown vs. Dental Board, No. 25078 in Supreme Court of the State of Kansas.

Dr. Otto U. King,
Chicago, Ill.

Dear Doctor King:

I am writing to inform you of the victory the Kansas State Board of Dental Examiners has won before the Kansas Supreme Court. In the above cases, complaint was made to the Board that these men by working in advertising offices were working under names other than their own. After hearing the cases the Board so ruled and revoked their licenses. They enjoined us from making it a matter of record, and the district court made it permanent holding that we had no authority to revoke a license. The Board appealed to the Supreme Court, which has just found that the Board has the sole right to revoke licenses, and that its decision is final, thus upholding our decision.

This ruling will make it possible for the profession to rid herself of some of her parasites.

Fraternally,

Geo. E. Burket,
Secretary-Treasurer.
Kingman, Kansas.

MAINE

Public Health Council, Augusta, Nov. 27: Gov. Baxter today nominated Dr. Henry A. Kelley of Portland as a member of the state public health council. Dr. Kelley will be the dental member of the council.—Portland Evening Express, Nov. 27, 1923.

MICHIGAN

Cancer Week in Detroit: "Cancer Week" was observed in Detroit under the auspices of the Wayne County Medical Society and the National Society for the Control of Cancer, February 16-21. Dr. Albert J. Ochsner, professor of surgery at the University of Illinois Medical School, Chicago, addressed several of the meetings.—Journal of the American Medical Association, Feb. 23, 1924.

MISSOURI

Medical Credit Bureau: A medical credit bureau was recently incorporated under the laws of Missouri in St. Louis with a capital of $110,000. The membership totals 740. The purpose of the bureau is to collect physicians', dentists', druggists' and hospitals' bad debts for fees commensurate with the best service; to render a professional credit rating service, and to lend money to enable patients to pay promptly their medical, dental, drug or hospital bills. Dr. John C. Morfit is president of the board of directors and Dr. Noxon Toomey, secretary.

NEW YORK CITY

Drop Dental Clinics in Public Schools: The board of education, February 13, voted to make no further provision for dental work in public school buildings, and to eliminate as soon as possible dental work as now being done. This means

that teeth which have been examined by dentists will henceforth be examined by nurses; if the nurse considers dental work necessary she will send a note to the parents. In abandoning this work, the board of education takes the stand that dental work for school children is for the department of health to provide in regularly organized free clinics. The Kings County Dental Society has passed resolutions protesting against the proposed abolishment of free dental clinics in the public schools, and the Allied Dental Council plans to take similar action at its next meeting.—Journal of the American Medical Association, Feb. 23, 1924.

NEW YORK

Progress at the University of Rochester: The foundations are now being laid for the medical school and hospital building of the University of Rochester. The building will be six stories high, and will house both medical school and hospital. It is expected that students for the first year's work in medicine will be received in the autumn of 1925. A differentiation between medical and dental students will not be made at all in the first year, and only to a limited extent in the second. The faculty appointments so far made are as follows: dean and professor of pathology, Dr. George H. Whipple, formerly dean and professor of research medicine at the University of California; professor of biochemistry, Walter R. Bloor, Ph.D., formerly professor of biochemistry at the University of California; professor of anatomy, Dr. George W. Corner, associate professor of anatomy at Johns Hopkins Medical School; professor of bacteriology, Dr. Stanhope Bayne-Jones, associate professor of bacteriology at Johns Hopkins Medical School; professor of gynecology and obstetrics, Dr. Karl M. Wilson, Baltimore; professor of medicine, Dr. William S. McCann, associate professor of medicine, Johns Hopkins Medical School; director of the Strong Memorial Hospital, Dr. Nathaniel W. Faxon, formerly assistant director of the Massachusetts General Hospital; professor of surgery, Dr. John Jamieson Morton, Jr., assistant professor of surgery at Yale Medical School, and superintendent of nurses, Helen Wood of Barnes Hospital, St. Louis. A contract has been made by the university with the city of Rochester with reference to the erection and maintenance of a municipal hospital of 240 beds adjacent to the Strong Memorial Hospital. By this contract the university agrees to deed to the city about 26 acres of land, and to give to the city, without cost, the services of the professional staff. Resident physicians, internes and nurses will be provided for the city hospital at cost by the university; also heat, laundry service and food.—Journal of The American Medical Association, Oct. 20, 1923.

FOREIGN

Public Dental Service: (Memorandum prepared by the Trades Union Congress and Labour Party Advisory Committee on Public Health.) So serious and far-reaching is the nature of the evils that follow from neglect of attention to the mouth and teeth that the Departmental Committee on the Dentists Act concluded its report in 1919 in the following words:

"We wish to state very strongly that, in our opinion, the State cannot afford to allow the health of the workers of the nation to be continuously undermined by dental neglect. Steps should be taken without delay to recognize dentistry as one of the chief, if not the chief, means for preventing ill-health, and every possible means should be employed for enlightening the public as to the need for conservative treatment of diseased teeth. The dental profession should be regarded as one of the outposts of preventive medicine, and as such encouraged and assisted by the State. Treatment should be rendered available for all needing it."

The recommendations contained in the unanimous Report of that Committee advocated the following steps, amongst others, as urgent:

(1) The establishment of a Public Dental Service;

(2) The completion as rapidly as practicable of an adequate system of school dental treatment.—Labour Magazine, quoted in The Dental Record, December, 1923.

A Dentist's £1,000 a year for 50 years: In a recent issue of the Evening News appears a paragraph which tells how Dr. Truman, who was Queen Victoria's dentist, became comfortably provided for. In 1851, the first Atlantic cable was laid, but nothing could be found that would prevent the material of the cable from being eaten away by the sea. Truman bethought himself that there were no acids so powerful as those from the human stomach. Obviously the vulcanite used in the manufacture of artificial teeth might solve the cable company's difficulties. After experimenting, he produced a composition that he patented, and of-

fered to the company. In return they offered him £10,000 outright, or a thousand a year as long as he lived. He took the £1,000 a year.

Dr. Truman actually drew the £1,000 a year for fifty years.—The Dental Surgeon, Oct. 13, 1923.

"Where Teeth Do Not Decay.": According to the Morning Post new light has been thrown on the decay of teeth by Dr. M. C. Grabham, who described to the Physiological Section of the British Association his researches in Porto Santo, a small island northwest of Madeira.

Dentists and toothbrushes, he said, were both unkown in the island, and this fact attracted his attention to the remarkably healthy condition of the teeth of the natives. He had personally examined the teeth of one-fifth of the population, and the insignificant number of cases of decay found could be traced to patients leaving the island and being infected elsewhere.

He ascribed this to a great extent to the highly mineralized water springs, which analysis showed to be rich in many chemical salts. A curious fact was that only soft food was eaten, and this in meagre quantities. Food was always taken cold, as also was the native form of coffee, and as the staple diet was porridge, made from maize, the teeth were never used for mastication. Meat and green vegetables were never eaten.

A remarkable feature was the appearance of a thin yellow line across the teeth in the upper jaw, which gradually spread and stained the teeth generally. This was due to the blood circulation extending into the tooth structure, as well as to some particular constituent in the local water. The island was only a short distance from Madeira, where the yellow stain was unknown, and it was, therefore, highly probable that it was due to local conditions. His experience was that in Porto Santo the yellow stain was a sure indication of a sound set of teeth.—The Dental Surgeon, Oct. 6, 1923.

GENERAL

The Alleged Connection between Tooth Infections and General Diseases: H. Schottmüller, Deutsch. med. Wchnschr., 48:181, Berlin, Feb. 9, 1922.

Schottmüller is trying to disprove the opinion, which first found its expression some ten years ago among American physicians, that infections of teeth not only very seriously endanger the general condition, but that they are the cause of a great many severe organic diseases. Fischer of Cincinnati is the main representative of this opinion. Abscesses in teeth, or alveolar pyorrhea are said to be frequently the cause of a thickening of bones, hypothyroidism, arrhythmia, rheumatism, climacteric disturbances, symptoms of ageing, Brights' disease, etc. It is assumed that morbific agents enter the circulatory system and cause metastases. This claim may be opposed by the fact that "chronic sepsis" requires either the existence of a focus, which is directly connected with the circulatory system, or of thrombophlebitis or endophlebitis, or of a lymphangitis, or of bacterial colonies in the arterial system. But sepsis only develops if extensive parts of the vessel-system are affected.

An infection in the dental pulp, or a periosteal tooth-abscess can never possess the properties of a septic focus. The writer has never observed any such phenomenon.

Fischer, following Rosenow's investigations, ascribes a particular influence to the Streptococcus viridans, which was discovered by Schottmüller. Occasionally this streptococcus could enter the blood and possibly cause chronic sepsis, which occurrence is known as endocarditis lenta. Among about 10,000 objects of bacteriologic investigation, the writer never found a case where a tooth-abscess was the source of bacteremia. Schottmüller also denies the correctness of the opinion that the Streptococcus viridans is nothing else than a common streptococcus. After a description of several cases of entirely useless wholesale extractions, he warns against this kind of treatment, which is liable to become a fashion similar to that of "extreme removal of tonsils."—Medical Survey.

Another report from an Indiana town says that for the first time in many years the town is without a doctor and advice is asked as to how to fill the vacancy. That is easy to answer. Have the people of the town guarantee a living income for a doctor who locates there, and then keep their medical patronage at home.—Journal of the Indiana State Medical Association, Feb. 15, 1924.

The Westinghouse Company announces the discovery of a new x-ray tube for therapeutic use which has more penetrating power and less irritating rays than afforded by any other x-ray tube on the market. As a matter of fact x-ray work is only in its infancy. We look for some

radical changes in the near future concerning the efficiency of various electric potentialities.—Journal of the Indiana State Medical Association, Feb. 15, 1924.

We Again Reiterate the Statement that there is room for the highly trained nurse, and we believe that she should be well compensated for her services, but it is very evident that she will not be available for the great majority of suffering human beings who are in moderate financial circumstances. Furthermore, every day it is getting more difficult to secure the services of trained nurses for the care of patients suffering from communicable diseases or for the care of what are known as "hard" cases. Though we admit knowingly highly trained nurses who never hesitate to take any cases, no matter what they are or where they are, our contention is that there is room for thousands of practical nurses who, having less training and having put less time, money and energy into their training, are willing to work for the modest compensation which the patients of ordinary means are able to pay. They also are less apt to discriminate in the selection of cases to be served. This sentiment is well voiced in the article by Dr. Charles H. Mayo in one of the lay magazines when he makes a plea for the development of 100,000 practical nurses.—Jour. of the Ind. State Med. Assoc.

Newspapers forever are looking for sensational news, and this is true of some newspapers more than others. A reputed new discovery concerning any phase of medicine and surgery is heralded in bold-faced type and the story well embellished, whether the facts substantiate it or not. Recently the public press has had an account of the grafting of a pig's eye upon a sightless boy, on the presumption that vision would be restored in that way. No doubt many gullible people believed the absurd and irrational story. The progress of scientific medicine is injured by such wild and fanciful tales and it is unfortunate that the public press is not more particular in determining facts before making any startling announcements concerning medical or surgical discoveries.—Journal of the Indiana States Medical Association, February, 1923.

Prevention of Simple Goiter: In these endemic goiter districts, if every woman would keep her thyroid saturated with iodin during every pregnancy, she would not develop goiter, nor would there be any tendency toward goiter formation in the thyroid of her child. This would save two of the goiter periods in the life of any individual. Then if every girl would keep her thyroid saturated with iodin during adolescence, that is, from the age of 11 to 16 inclusive, none would develop goiter.

As to the prevention of goiter in boys, the following facts are pertinent: (1) Goiter is at least six times more frequent in girls than in boys. (2) A large majority of goiters in boys are congenital and could be prevented by the administration of iodin to the mother during pregnancy. (3) While occasionally a boy does develop goiter at puberty, or after illness or as the result of some chronic infection, in most cases the goiter will disappear if it is treated promptly and properly.—The Amer. Jour. of Public Health, February, 1923.

Longer Life for Workers: The Metropolitan Life Insurance Company is the largest life insurance company, not only in this country, but in the world. It has a special industrial department through which it issues life insurance policies to working men. In 1921, its reports showed that what insurance men call "the expectancy of life," that is, the length of time that the average person will live after a certain time, for wage-earners was 55.08 years. That is, a child at birth, on the average, will live to be a little over 55 years. Ten years ago, the average length of life was only 46½ years. This is probably the most remarkable increase in health conditions that has ever taken place. It is due to long years of education, sanitation, improvement in wages and living conditions, prevention of epidemics, improvement in methods of treating diseases, etc. Yet there are still many controllable conditions which prevent the average duration of life from being great.—"Health," Vol. III, No. 1.

Arsenic as a Cause of Cancer: The possibility of the production of malignant growths as a result of the action of arsenic was suggested by Jonathan Hutchinson as long ago as 1887. In his opinion, the prolonged internal administration of arsenic in the treatment of such skin conditions as psoriasis was apt to induce a malignant tendency in the very skin condition it was intended to cure. The presence of arsenic as an impurity in a great many of the products

dealt with in those industries, the workers in which are prone to develop cancer, has led other observers to blame the arsenic in these cases as well.

There is little direct evidence to be brought against arsenic. A case was, however, reported at the annual meeting of the British Medical Association by Dr. Kennaway, in which an epithelioma was produced in a mouse by repeated applications of a weak solution of arsenious acid to the skin of the mouse. The death rate amongst the mice was so high that only this one success could be reported. This case goes to show that arsenic may, in certain cases, produce cancer. That it is a frequent cause is doubtful. It is a drug that is very extensively used, and the cases in which there is suspicion of subsequent cancer are few and far between.

This aspect of the question has special interest for dentists, in view of the extent to which arsenic is used in dental work. The experimental evidence at our disposal, however, shows that very prolonged use of arsenic is required in order to produce malignant disease, whereas in dental surgery the drug is employed only for short periods. It is, therefore, so improbable that the dental use of arsenic could produce such a condition that the possibility, may, for practical purposes, be disregarded.—The Dental Surgeon.

Preventive Medicine and the General Practitioner: If the medical profession, and especially its largest, most important contingent, the family physician, does not assume leadership in this movement to prevent disease, other agencies will undertake the task. Indeed, they are already doing this very thing. The social-service worker, the public-health nurse, the great benevolent foundations, have entered the field and are meeting the demand of the public for the institution of measures by which they may secure the benefits of modern sanitary science. Medical men are prone to underestimate the degree to which the public is already informed as to the development of modern medicine and its possibilities in the prevention of disease. Perhaps the best evidence of this is the large amount of space devoted to health topics in the current literature of our time. Many of the leading newspapers print a health column every day edited by more or less—frequently less—competent physicians. The periodical magazines circulating in the aggregate millions of copies seldom print an issue without one or more articles dealing with some achievement of medical science.—Dodson, Journal American Medical Association, January 6, 1923.

American Medical Association, 535 No. Dearborn St., Chicago, Ill., May 3, 1923.

Dr. Otto U. King, Sec'y,
American Dental Association,
Chicago, Ill.

Dear Doctor King:

In reply to your letter of April 28, I take pleasure in submitting the following information:

There are approximately 150,000 physicians in the United States. We have no definite information as to just how many of these are eligible for membership in the American Medical Association. There are slightly more than 88,000 members of the American Medical Association. I regret that we cannot give you information concerning the number of specialists of various kinds.

According to the 1920 census report, there were 5,030 osteopaths in the United States at the time the census was taken. In 1921, B. J. Palmer, who seems to be the king of all the chiropractors, published a list which is said to have contained the names of 5,109 chiropractors. I have no first hand information about this list, but have it on good authority that it was printed and that the above figures were given by Mr. Palmer.

According to the 1920 census report, the total number of persons treating disease, omitting physicians and osteopaths, was given as 14,774. It appears, therefore, that there were approximately 8,000 cultists exclusive of osteopaths and chiropractors.

Very truly yours,
Olin West, Sec'y.

DENTAL CORPS

Army: Major Harry E. Smalley from Brooklyn, N. Y., to Walter Reed General Hospital, D. C., for observation and treatment.—Army and Navy Register, March 15, 1924.

Army: Colonel John H. Hess report to retiring board at Presidio of San Francisco for examination.—Army and Navy Register, March 22, 1924.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Dental Association, November 10, 11, 12, 13, 14, 1924, Dallas, Texas.

American Medical Association, June 9-13, 1924, Chicago, Illinois.

Canadian Dental Association, August 4-7, 1924, Vancouver, B. C.

Dental Protective Association of the United States, 4:00 p. m., December 15, 1924, Palmer House, Chicago, Illinois.

Federation Dentaire Internationale, August 6, 1924, Luxemburg.

National Association of Dental Examiners, November 10, 11, 1924, Dallas, Texas.

STATE SOCIETIES

National Capital, at Washington, D. C., first Tuesday of every month.

May

Arkansas, at Ft. Smith (12, 13, 14).

California State, at San Francisco (26, 27, 28, 29).

Illinois, at Springfield (13, 14, 15).

Indiana, at Indianapolis (19, 20, 21, 22).

Iowa, at Des Moines (6, 7, 8).

Maryland, at Baltimore (5, 6, 7).

Massachusetts, at Boston (5, 6, 7, 8, 9).

Mississippi, at Jackson.

Missouri, at Excelsior Springs (26, 27, 28).

Nebraska, at Lincoln (19, 20, 21, 22).

New York, at Binghamton (7, 8, 9, 10).

Pennsylvania, at Pittsburgh (13, 14, 15).

South Dakota, at Huron (1, 2, 3).

Tennessee, at Chattanooga (5, 6, 7).

West Virginia, at Huntington (19, 20, 21).

June

Colorado, at Glenwood Springs (19, 20, 21.)

New Hampshire, at The Weirs (18, 19, 20).

North Dakota, at Grand Forks (4, 5, 6).

South Carolina, at Charleston (17-19).

Southern California, at San Diego (24, 25, 26).

Utah, at Salt Lake City (25, 26, 27, 28).

Wyoming, at Cody (17-19).

July

Wisconsin, at Milwaukee (8, 9, 10).

November

American Dental Association, at Dallas (10, 11, 12, 13, 14).

Arizona, at Phoenix.

Texas, at Dallas (10, 11, 12, 13, 14).

December

Ohio, at Columbus (4, 5, 6).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

Alabama, at Birmingham, June 16. Secretary-Treasurer, H. Clay Hassell, 616-22d Avenue, Tuscaloosa, Alabama.

Arkansas, at Little Rock, July 3-5. Secretary, I. M. Sternberg, Merchants Bank Building, Fort Smith, Arkansas.

California, at San Francisco, June 18, and Los Angeles, July 28. Secretary, C. A. Herrick, 133 Geary Street, San Francisco, California.

Connecticut, at Hartford, June 26-28. Recorder, Arthur B. Holmes, 43 Central Avenue, Waterbury, Connecticut.

Delaware, at Wilmington, June 25-26. Secretary, W. S. P. Combs, Middletown, Delaware.

Florida, at Jacksonville, June 25. Secretary, R. P. Taylor, 414 St. James Building, Jacksonville, Florida.

Indiana, June 9 to 14. Secretary, H. C. McKittrick, 1006 I.O.O.F. Building, Indianapolis, Indiana.

Iowa, at Iowa City, May 26. Secretary, C. B. Miller, 726 Fleming Building, Des Moines, Iowa.

Kansas, at Wichita, June 16. Secretary, George E. Burket, Kingman, Kansas.

Kentucky, at Louisville, June 3. Secretary, J. H. Baldwin, 908 Francis Building, Louisville, Kentucky.

Maine, at Augusta, June 24-26. Secretary, Henry Gilman, 192 State Street, Portland, Maine.

Maryland, at Baltimore, June 10-12. Secretary, T. L. McCarriar, 1822 N. Charles Street, Baltimore, Maryland.

Massachusetts, at Boston, June 17-25. Secretary, J. N. Carrieré, 146 State House, Boston, Massachusetts.

Minnesota, at Minneapolis, June 20-28. Secretary, R. B. Wilson, 1133 Lowry Bldg., St. Paul, Minnesota.

Michigan, June 9-14. Secretary, B. S. Sutherland, 401 Ward Building, Owosso, Michigan.

Nevada, at Reno, June 23. Secretary, G. H. Marven, P. O. Box 56, Reno, Nevada.

New Jersey, at Trenton, June 23. Secretary, John C. Forsyth, 429 E. State St., Trenton, New Jersey.

North Carolina, at Raleigh, June 16. Secretary, F. L. Hunt, Asheville, North Carolina.

North Dakota, at Fargo, July 8. Secretary, W. E. Hocking, Devils Lake, North Dakota.

Oklahoma, at Oklahoma City, June 23-26. Secretary, L. M. Doss, 245 American National Bank Building, Oklahoma City, Oklahoma.

Pennsylvania, at Philadelphia and Pittsburgh, June 18-21. Secretary, Alexander H. Reynolds, 4630 Chester Avenue, Philadelphia, Pennsylvania.

Rhode Island, at Providence, June 25-27. Secretary, Albert L. Midgley, 315 Butler Exchange Building, Providence, Rhode Island.

South Dakota, at Souix Falls, June 25. Secretary, L. R. Walston, Redfield, South Dakota.

Texas, at Dallas, June 16-19. Secretary, R. L. Rogers, Amarillo, Texas.

Vermont, at Montpelier, June 30 to July 2. Secretary, Philip E. Mellen, Middlebury, Vermont.

Virginia, at Richmond, June 10. Secretary, John P. Stiff, Fredericksburg, Virginia.

Wisconsin, at Milwaukee, June 23-28. Secretary, J. L. Blish, Fond du Lac, Wisconsin.

Wyoming, at Powell, June 23-25. Secretary, Thew J. Ice, Lock Box 116, Powell, Wyoming.

ALABAMA BOARD OF DENTAL EXAMINERS

The Board of Dental Examiners of Alabama will meet June 16, 1924, at 9 a. m. at the Birmingham Dental College, Avenue F and 20th Street, Birmingham, for the purpose of examining applicants who hold diplomas from reputable dental colleges for certificates of qualification to practice dentistry in Alabama.

All applications accompanied by the examination fee must be filed with the secretary-treasurer at least two weeks before the examination, or the applicant will be barred from the examination. For further information, application blanks, etc., address

H. CLAY HASSELL, *Secretary-Treasurer,*
616-22d Avenue, Tuscaloosa, Ala.

ARKANSAS STATE BOARD OF DENTAL EXAMINERS

The Arkansas State Board of Dental Examiners will hold an examination at the Marion Hotel, Little Rock, July 3-5, 1924. For further particulars, address

I. M. STERNBERG, *Secretary,*
Merchants Bank Bldg., Fort Smith, Ark.

DELAWARE STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Delaware Board of Dental Examiners will be held in the Municipal Building, Tenth and King Streets, Wilmington, June 25-26, 9 a. m. to 5 p. m.

For further information, apply to

W. S. P. COMBS, *Secretary,*
Middletown, Del.

FLORIDA STATE BOARD OF DENTAL EXAMINERS

The Florida State Board of Dental Examiners will meet in annual session in Jacksonville, June 25, at 8 a. m. for the purpose of examining all qualified applicants who may appear before the Board at that time, and for the purpose of transacting any business which may rightfully come before the Board. All applications should be in the hands of the Secretary not later than June 15.

R. P. TAYLOR, *Secretary,*
414 St. James Bldg., Jacksonville, Florida.

KENTUCKY STATE BOARD OF DENTAL EXAMINERS

The Kentucky State Board of Dental Examiners will hold its annual examination of candidates for license to practice, June 3, 1924, at Louisville, commencing at 8 a. m. Graduates of schools rated as *A* and *B* by the Dental Educational Council of America, only, are eligible to examination. For information and blanks apply to

J. H. BALDWIN, *Secretary,*
908 Francis Building, Louisville, Ky.

KANSAS STATE BOARD OF DENTAL EXAMINERS

The Kansas State Board of Dental Examiners will hold its spring examination at the Forum, Wichita, Kansas, the week of June 16, 1924. The headquarters of the board will be the Broadview Hotel. For further information, write to

GEORGE E. BURKET, *Secretary,*
Kingman, Kansas.

MAINE STATE BOARD OF DENTAL EXAMINERS

The Board of Dental Examiners of the State of Maine will hold it annual meeting at the State House, Augusta, June 24-26, 1924. For further particulars and application blanks, apply to

HENRY GILMAN, *Secretary,*
192 State Street, Portland, Maine.

MARYLAND STATE BOARD OF DENTAL EXAMINERS

The next examinations of the Maryland State Board of Dental Examiners will be held June 10-12, 1924, at the University of Maryland Dental Department, Lombard and Greene Streets, Baltimore, Maryland. For application blanks and further particulars address

T. L. MCCARRIAR, *Secretary,*
1822 N. Charles St., Baltimore, Maryland.

MASSACHUSETTS BOARD OF DENTAL EXAMINERS

The Massachusetts Board of Dental Examiners will hold an examination for registration for both dentists and oral hygienists at Boston, June 17-25, 1924. Full information, application blanks, etc., may be secured at the office of the secretary. All applications must be filed in the secretary's office at least ten days before the date set for the examination.

J. N. CARRIERE, *Secretary,*
146 State House, Boston, Mass.

MICHIGAN STATE BOARD OF DENTAL EXAMINERS

The Michigan State Board of Dental Examiners will hold its next examination June 9-14, 1924. Application should be in thirty days previous to the meeting. Address

B. S. SUTHERLAND, *Secretary,*
401 Ward Bldg., Owosso, Michigan.

NEVADA STATE BOARD OF DENTAL EXAMINERS

The Nevada State Board of Dental Examiners will hold its next examination at Reno, Nevada, beginning June 23, 1924.

G. H. MARVEN, *Secretary,*
P. O. Box 56, Reno, Nevada.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the North Carolina State Board of Dental Examiners will be held in Raleigh, N. C., June 16, 1924, beginning promptly at 9 a. m. For further information and application blanks address

F. L. HUNT, *Secretary,*
Asheville, N. C.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the State Board of Dental Examiners of North Dakota will be held in Fargo the second Tuesday in July. All applications must be in the hands of the secretary at least ten days before the meeting.

For application blanks and further information, apply to

W. E. HOCKING, *Secretary*
Devils Lake, N. D.

OKLAHOMA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Oklahoma State Board of Dental Examiners will be held at Oklahoma City, June 23-26, 1924, in the State Capitol building.

L. M. DOSS, *Secretary,*
245 American National Bank Bldg.,
Oklahoma City, Okla.

PENNSYLVANIA STATE BOARD OF DENTAL EXAMINERS

The regular examinations of the Pennsylvania State Board of Dental Examiners will be held in Philadelphia and Pittsburgh, June 18-21, 1924. The practical examinations will be held at the Evans Dental Institute, Fortieth and Spruce streets, Philadelphia, and at the University of Pittsburgh, Pittsburgh, June 18. The operative examination will be held at 8:30 a. m., and the prosthetic examination at 1:30 p. m. The theoretical examinations will be held at the City Hall, Philadelphia, and at the University of Pittsburgh, Pittsburgh, June 19-21. A partial examination will be held June 19 and 20 for the students who have completed the first two years in dental

colleges. An examination will be held for dental hygienists on the same dates and at the same places by the board of examiners.

Application papers may be secured from the Department of Public Instruction, Harrisburg.

ALEXANDER H. REYNOLDS, *Secretary,*
4630 Chester Avenue, Philadelphia, Pa.

RHODE ISLAND STATE BOARD OF REGISTRATION IN DENTISTRY

A meeting of the Rhode Island State Board of Registration in Dentistry will be held in the State House, Providence, R. I., June 25-27, 1924, beginning each day at 9 a. m. Candidates shall present to the secretary of this board, at least one week before the examination, a written application on a form provided by the board, together with the examination fee of $20.00.

ALBERT L. MIDGLEY, *Secretary,*
315 Butler Exchange Bldg., Providence, R. I.

VIRGINIA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Virginia State Board of Dental Examiners will be held in Richmond, Va., commencing June 10, at 9 a. m.

JOHN P. STIFF, *Secretary,*
Fredericksburg, Va.

WISCONSIN BOARD OF DENTAL EXAMINERS

The Wisconsin State Board of Dental Examiners will hold a license examination for dentists and dental hygienists June 23-28, 1924, in Milwaukee. Candidates are requested to send in their applications as soon as possible to avoid delay and mistakes. All information and blanks will be sent on application to the secretary.

J. L. BLISH, *Secretary,*
Fond du Lac, Wis.

WYOMING STATE DENTAL ASSOCIATION

The date of the meeting of the Wyoming State Dental Association has been changed from June 16-18 to June 17-19. The meeting will be held at Cody, the entrance to Yellowstone Park, which opens about June 15 to 20.

For further information, address,

E. C. ANDREW, D.D.S.,
Cheyenne, Wyo.

FORMAL OPENING OF DEANER INSTITUTE

105 HUNTER AVENUE, KANSAS CITY, Mo.
Friday and Saturday, May 23-24, 1924.

FRIDAY

10:00 A. M. Dedicatory exercises and unveiling of bronze tablet, Otto U. King, Chicago, Ill.

2:00 P. M. Address, W. A. Giffen, Detroit, Michigan.

3:00 P. M. "Cysts and Tumors of the Oral Cavity", Chalmers J. Lyons, Ann Arbor, Mich.

6:00 P. M. Dinner for honor guests at Kansas City Club.

8:00 P. M. "Focal Infection With Special Reference to Oral Sepsis", Edward C. Rosenow, Rochester, Minnesota.

SATURDAY, 10:00 A. M. CLINICS

Porcelain Jacket Crown Technic, A. LeGro, Detroit, Mich.

Illustrated Clinic-Prosthesis, W. A. Giffen, Detroit, Mich.

Oral Surgery, C. J. Lyons, Ann Arbor, Mich.

Radiographic Diagnosis of Sinusitis, E. R. Warner, Denver, Colorado.

Crown and Bridge Technics, E. T. Tinker, Minneapolis, Minn.

Study of Art Anatomy With Special Reference to Face Form and Expression, E. H. Bruening, Omaha, Neb.

Survey of Clasps, George P. Williams, Topeka, Kansas.

Constructive versus Destructive Partial Restorations, Charles A. Furrow, Tulsa, Okla.

Gold Inlay Technic, E. E. Welch, Topeka, Kansas.

Cast Gold Crown and an Inlay Bridge Attachment, Charles E. Woodbury, Council Bluffs, Iowa.

MISSOURI STATE DENTAL ASSOCIATION MEETING

The Missouri State Dental Association convenes at Excelsior Springs, Mo., May 26-28, 1924. Excelsior Springs is a famous health resort and an ideal place for the state meeting, since the hotel accommodations, interurban and railroad facilities are ample, and adequate to care for great numbers of guests. Excelsior Springs is located 35 miles northeast of Kansas City on a paved highway; has fine golf courses, riding stables, tennis courts, ball grounds, etc., and is beautifully located in a picturesque valley.

The majority of the members of the staff of Deaner Institute and their guests are planning

to motor to Excelsior Springs on Sunday morning, May 25, play golf that afternoon and be ready for the opening session of the Missouri State Dental Association meeting the following morning.

Kindly keep in mind the dates of the Missouri State Dental Association meeting—May 26, 27 and 28—and make your plans to be away from your offices long enough to take advantage of the excellent program that the officers of the Society have arranged for its guests.

CANADIAN DENTAL ASSOCIATION

The Canadian Dental Association will hold its twelfth biennial meeting in Vancouver, B. C., August 4-7, 1924.

SYDNEY W. BRADLEY, *President,*
206 Laurier Ave. West, Ottawa, Canada.
W. J. BRUCE, *Chairman Executive Com.,*
Birk's Building, Vancouver, B. C.

CLINIC DETAILS FOR DALLAS SESSION, NOVEMBER 10-14, 1924

Clinics to be given at the meeting of the American Dental Association in Dallas, November 10-14, 1924 will consist of five types:

(1) State Clinics; (2) Section Clinics; (3) Group or Study Club Clinics; (4) New South Clinics, and (5) Junior Clinics.

The state individual clinic group will be placed upon a representative basis by requesting each state society to furnish clinicians for this group to the number of one to the allotted number of delegates.

No one will be permitted to clinic in this group without the recommendation of the president of his respective state society.

All states will be invited to clinic in this group except the states hereinafter mentioned as the New South.

All State Clinics will be staged Thursday afternoon, November 13.

Section Clinics will be taken care of by the chairmen of the seven different sections and each one will be requested to furnish three clinics from his respective section.

No one will be allowed to clinic in this group without the endorsement of his respective section chairman.

Group or Study Club Clinics will be secured by inviting each state society to furnish not to exceed three groups of not over ten clinicians each.

These groups will consist of a number of clinicians who will demonstrate their subjects in successive steps and no group will be allowed to clinic without the endorsement of the president of the respective state society.

New South and Junior Clinics will be handled by our host, and the committee in charge is now active in securing the proper material.

The states represented in the New South Clinic are Texas, Southern California, Arizona, New Mexico, Oklahoma, Mississippi, Arkansas and Louisiana (eight states).

The Junior Clinic will consist of a number of 1920-21-22 and 1923 graduates who will clinic on various subjects, and Texas has promised us a pleasant surprise in both the New South and Junior Clinics.

All clinics except state clinics will be staged Friday morning, November 14.

H. P. PINNEY,
General Chairman of Clinics,
108 N. State St., Chicago, Ill.

ALUMNI ASSOCIATION OF THE COLLEGE OF PHYSICIANS AND SURGEONS, SAN FRANCISCO

The first annual (reorganization) alumni meeting and homecoming of the College of Physicians and Surgeons Dental Alumni will be held at the College, 344-14th Street, San Francisco, California, May 24, 1924. Paul J. Boyens, chairman of the clinic committee, has arranged an attractive program of papers and clinics; prominent among them will be an address by John P. Buckley. All ethical members of the Alumni of the school are cordially invited.

SHIRLEY J. ASHBY, *Chairman,*
MERVIN L. PERKINS, *Secretary.*

NEW YORK SOCIETY OF ORTHODONTISTS

The following resolution was unanimously adopted at the annual meeting of the New York Society of Orthodontists, held in New York City, February 27, 1924.

WHEREAS: The progress in the practice of orthodontics depends upon the free and unlimited development of mechanical ideas, as applied to orthodontic appliances; and in the free interchange of ideas among members of the profession; be it therefore

Resolved, That the practice of individuals, companies or corporations in obtaining patents on mechanical devices, appliances or instruments, and using said patents to discourage or prohibit the use of any devices, appliances or instruments be considered by this Society as unfair to the members of the profession and detrimental to the advancement of orthodontics; and be it further

Resolved, That when individuals, companies or corporations are guilty of such acts that they be notified by this Society, and that their

action is considered to be against the best interests of the science of orthodontics; and be it further

Resolved, That any member of the New York Society of Orthodontists who violates the foregoing resolution shall be subject to the action of the Society for expulsion; and further be it

Resolved, That a copy of these resolutions be spread in the minutes and published by the various dental journals.

C. W. B. WHEELER, *President*,
17 East 38th Street, New York, N. Y.
WILLIAM C. FISHER, *Secretary-Treasurer*,
501 Fifth Avenue, New York, N. Y.

THE DENTAL HYGIENISTS' ASSOCIATION OF THE STATE OF NEW YORK

The fourth annual meeting of the Dental Hygienists' Association of the State of New York will be held at Kalurah Temple, Binghamton, N. Y., May 9 and 10, 1924. Hotel reservations should be made direct with the hotel managements, Hotels Arlington, Bennett or Carlton. The executive board will meet May 8 at 3 p. m.; business and literary meetings May 9, and clinics Saturday morning, May 10.

A cordial invitation is extended to dentists and hygienists to attend literary meetings and clinics. For further information apply to

MILDRED L. SKINNER, *President*,
39 Falls Street, Niagara Falls, N. Y.
GRETCHEN GOLDSMITH, *Cor. Secretary*,
11 Bates Block, Ithaca, N. Y.

ANNUAL HEALTH EDUCATION CONFERENCE

At the invitation of the Massachusetts Institute of Technology, a working conference in Health Education is to be held, June 23-28, at Cambridge. The conference called by the Health Education Division of the American Child Health Association will be limited to 100. Registration must be made in advance. For further information, address

EMMA DOLFINGER,
370 Seventh Avenue, New York, N. Y.

AMERICAN CHILD HEALTH ASSOCIATION

Some city or county in one of eleven far western states is to be awarded the fourth in the series of five-year child health demonstrations conducted by the Child Health Demonstration Committee, associated with the American Child Health Association for the supervision of the Commonwealth Fund Program.

The city or county must be between 20,000 and 75,000 population and be located in one of the following states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington or Wyoming.

The city or county winning the award will be given assistance by the Child Health Demonstration Committee in safeguarding the life and health of its mothers and children. The community in the Pacific Coast or Rocky Mountain states to be awarded this five-year demonstration will take a conspicuous place in the national child health program now under way.

This announcement was made in the *Child Health Magazine* by Barry C. Smith, general director of the Commonwealth Fund and chairman of the Child Health Demonstration Committee.

The committee is already conducting three demonstrations: one in Fargo, N. D., in the middle west, another in Rutherford County, Tenn., in the rural areas of the South, and the third in Athens, Ga., designed to meet typical urban problems in the South.

The committee trusts that the establishment of a demonstration in a city or county of the Far West will aid in the development of a health plan for the children of that community in a similar way. The proposed demonstration, it is hoped, may be of indirect help to those promoting the cause of child health in that entire area.

Any city or county in these states with a population between 20,000 and 75,000 will be eligible for consideration. The selection of the center will be based upon a careful review of the whole health situation and the needs of the community. But the paramount consideration in making the choice will be the sincerity of the community's desire to develop a complete and rounded child health plan for the community as a whole.

The readiness shown by citizens and public officials to assume early and increasing responsibility, financial and otherwise, for the demonstration, will be one of the tangible evidences of the probable success of the undertaking.

The demonstration will be worked out with the utmost care. It will include all matters that relate to child health. The proper safeguards for both mother and child before the infant is born, at childbirth, and afterwards, and follow-up care to bring the new citizen safely through his most dangerous age, will be one part of the program. The neglected period between babyhood and school age will be another. Stress will be laid on teaching school children the necessity of being healthy in order to enjoy their games as well as to

advance in their education. The development of health habits and the correction of physical defects will also be considered essentials. The community's responsibility for providing a safe supply of milk, wholesome living conditions, playgrounds and other necessities for the growth of its children is another factor which will be emphasized in the community program to build up the health of its children.

The Child Health Demonstration Committee, believing that the community itself must play a leading part in the demonstration, will direct its own efforts toward assisting rather than dictating. The physicians in the community will be looked to for guidance in the matters of health supervision and persons needing medical treatment will be referred to them. Similarly, to the teachers in the public schools and the parents will fall the real task of educating the children in health ideals and habits. Cooperation of public officials, health workers and citizens will be essential for the success of this community venture in the building of physically sound citizens. The development of initiative and self-reliance on the part of the children themselves will be a vital item.

The Child Health Demonstration Committee is a joint committee of the Commonwealth Fund, whose liberal grant makes possible this program, and of the American Child Health Association. It consists of the following: Barry C. Smith, general director of the Commonwealth Fund, chairman; Courtenay Dinwiddie, director; Dr. Philip Van Ingen, treasurer; Miss Ella Phillips Crandall, Dr. Richard A. Bolt, Dr. Livingston Farrand, Miss Sally Lucas Jean and Miss Barbara S. Quin.

AMERICAN CHILD HEALTH ASSOCIATION,
370 Seventh Avenue, New York, N. Y.

THE WILLIAM J. GIES FELLOWSHIP IN BIOCHEMISTRY

March 1, 1924.

To Friends of Professor Gies:

You have probably received a previous communication regarding The William J. Gies Fellowship in Biochemistry. A committee has been appointed to represent the School of Dentistry, Columbia University, and the organized dental profession in New York City, State, and the United States. It is working in conjunction with a committee representing The School of Medicine and Professor Gies' Colleagues in Biological Chemistry.

It is very fitting that the practitioners of this great branch of medicine should take an active part in securing funds for the Fellowship. The work of Professor Gies in the interests of dental science, and especially the advancement of dental education, has been of fundamental and far-reaching importance. In any movement to honor him, we should stand in the front rank. Every professional man acknowledges a debt to his profession, and here is a most appealing way to reduce that perpetual deficit.

The purpose is to raise the sum of $20,000, the annual interest from which fund will maintain the $1,000 Fellowship, as founded by the Columbia Schools of Medicine and Dentistry. Nearly one-half the desired amount is now in hand; it is hoped the remainder will be received during the next three months.

The presentation of the Fellowship Fund to the University will take place during the present academic year. Final date and details will be sent you.

Checks will be welcomed in any amount from $1.00 up and they should be made payable to the *Treasurer of Columbia University*, and mailed in the enclosed envelope to the Secretary of this committee, Dr. Leuman M. Waugh, 576 Fifth Avenue, New York City.

An important part of this project will be the presentation to Professor Gies of a book containing letters of appreciation from his friends and co-workers. Please send your letter at once, with or without a contribution, to Dr. Waugh.

Very truly yours,
WILLIAM B. DUNNING, *Chairman*.

PATENTS OF INTEREST TO DENTISTS

1424187. Container for fluids for injection purposes, John J. Seelman, Milwaukee, Wis.

1424527. Dental crown remover, Louis R. Siegel, Cleveland, Ohio.

1425055. Dental crown structure, Elon J. Rose, Portland, Oregon.

1425844. Dental clasp, Laurent Engberg, Barcelona, Spain.

1425601. Porcelain tooth for crown, bridge, and plate work, Vincent Mallon, New York, N. Y.

1426114. Artificial interchangeable tooth, Abraham Schwartz and J. Wieder, Boston, Mass.

1426965. Device for holding hypodermic needles while sharpening the same, David Crowther, Minneapolis, Minn.

1426661. Artificial tooth, Vincent Mallon, New York, N. Y.

1426662. Dental manikin-head bench rest, Vincent Mallon, New York, N. Y.

1426935. Tooth protector for dental clasps, George A. Wiechert, New York, N. Y.

1427286. Dental handpiece, Robert E. Graves, Houston, Texas.

1427496. Dental pressure gauge, Iwao Ono, Los Angeles, Calif.

1427237. Setting backs to porcelain teeth, Ixumi Shikusawa, Chigusa Machi, Japan.

1427503. Tooth cleaning and polishing bur, Charles H. Wake, Los Angeles, Calif.

1427908. Surgical baker, Lena Perlman, Philadelphia, Pa.

1429082. Sanitary case, Samuel A. Kornsweet, Los Angeles, Calif.

61471. Design, Manikin, John E. Lester, Seattle, Wash.

1429552. Artificial tooth anchorage, Jesse Arkin, New York, N. Y.

1429322. Dental casting ring, Allen O. Brophy, Oak Park, Ill.

1429276. Tablet for producing iodine, Lewis Davis, Worcester, Mass.

1429748. Facing pin for artificial teeth, Frederick Maeulen, Rahway, and G. L. Van Allen, Newark, N. J.

1429749. Lock for orthodontic appliances, Frederick Maeulen, Rahway, and G. L. Van Allen, Newark, N. J.

1429807. Central casting machine, Joseph V. Turner, Wilson, N. C.

1430354. Therapy lamp, Fred F. Burdick, Milton, Wis.

1430070. Spatulating device, Charles F. Franzwa, Eau Claire, Wis.

1430095. Therapeutic apparatus, William Meyer, Chicago, Ill.

1430096. X-ray apparatus, William Meyer, Chicago, Ill.

1430967. Toothbrush, Adam E. Fendrich, Weehawken, N. J.

1430550. X-ray apparatus, George Hotaling and W. D. Coolidge, Schenectady, N. Y.

1430925. Sterilizer, Albert D. Pentz, Jr., New York, N. Y.

1431063. X-ray cathode, Sinclair Tousey, New York, N. Y.

1431578. X-ray system, Harry D. Garretson, New York, N. Y.

1431159. Tooth-mounting card, Edmund J. Huff, Jr., Philadelphia, Pa.

1431177. Inhaling device, Richard Palmer, Teaneck, N. J.

1431425. Tooth crown, John E. Richmond, Eugene, Oregon.

1431713. Alloy, Joseph O. Whiteley, York, Pennsylvania.

1431860. Dispensing apparatus for liquids, Daniel A. Zurbrigg, Milford, Del.

1432383. Sanitary breath deflector, Darwin Comings, Scranton, Pa.

1432545. Investment material, Laurence J. Gilbert, Vicksburg, Minn.

1432708. Stabilizer for lower dentures, Norman M. MacKay, Worcester, Mass.

1432715. Toothbrush, Arnulfe Mendoza, Los Angeles, Calif.

1432412. Spatula, Harry Rietveld, Milwaukee, Wis.

1433332. Dental implement, Wm. H. Ambuhl, Philadelphia, Pa.

1433108. Cap-crown protecting device, Joseph H. Boucher, Cambridge, Mass.

1433180. Alloy, Archibald H. Coplan, Ottawa, Canada.

1433286. Physician's heating appliance, Fabian M. Kannenstine, Chicago, Ill.

1433464. Dental radiograph device, Collins A. LeMaster, St. Louis, Mo.

1433104. Apparatus for administering anesthetic gases, Richard Von Foregger, Roslyn, New York.

1433979. Preparation for the treatment of pyorrhea, Charles W. Archer, Gary, Indiana.

1433997. Artificial tooth and backing therefor, James D. Frankel, Chicago, Ill.

1433609. Combination comb and toothbrush, Charles E. Fullam, Philadelphia, Pa.

1433770. Lingual bar, Leon S. Wolfe, Washington, D. C.

Copies of above patents may be obtained for twenty-five cents each, by addressing John A. Saul, Solicitor of Patents, Fendall Building, Washington, D. C.

Convention

AMERICAN DENTAL ASSOCIATION

NOVEMBER 10-14, 1924

DALLAS, TEXAS

"The City of the Hour"

CONVENTION AND EXHIBIT HALL

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FIRST GENERAL SESSION, SCIENTIFIC SECTIONS, PUBLIC HEALTH EXHIBIT, CLINICS, REGISTRATION BOOTHS, MANUFACTURERS' EXHIBITS, RESTAURANT, LUNCH AND REST ROOMS

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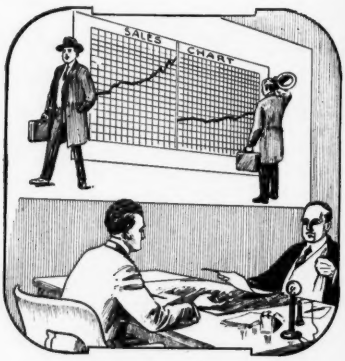
Let Us Sit Down a Minute and Figure This Thing Out---!

By ERNEST V. MADISON



FIRST we'll start out two salesmen—say for houses in New York City—and both selling to men in the dental field in the same territory, so that their hotel bills and other expenses are identical. One sells products of which we have never heard. The other sells many of the products which are advertised in the *Journal of the American Dental Association* and which we have been reading about.

Salesman A calls on us and on hundreds of other men in the dental field during his trip. He must overcome our indifference and unfamiliarity with the product. He must use much of our time in telling us about the qualities and merits of his goods, and often we are too busy to give him all the time he needs for the purpose. Even though he has impressed us with his personality and selling ability, we hesitate sometimes to give him an order because we know nothing about his house or his merchandise.

Salesman B represents an old acquaintance. We know his firm and merchandise through advertisements in the *Journal of the American Dental Association.* We feel the *confidence of familiarity* in his house and his line. He is the salesman more likely to get the larger order from us and from the greater number of men in the dental field in this territory.

Which one of those houses can afford to sell to us at the smaller margin of profit? Cannot the house with the lesser selling resistance give us better value for the same money—or the same value for less money?

Aren't you and I *pocketbook-wise* to buy products which are advertised in the *Journal of the American Dental Association?* Isn't it obvious that advertising in this paper is a dividend-paying force for the advertiser and for us?